JUNE 1948 1/6

The GEOGRAPHICAL MAGAZINE

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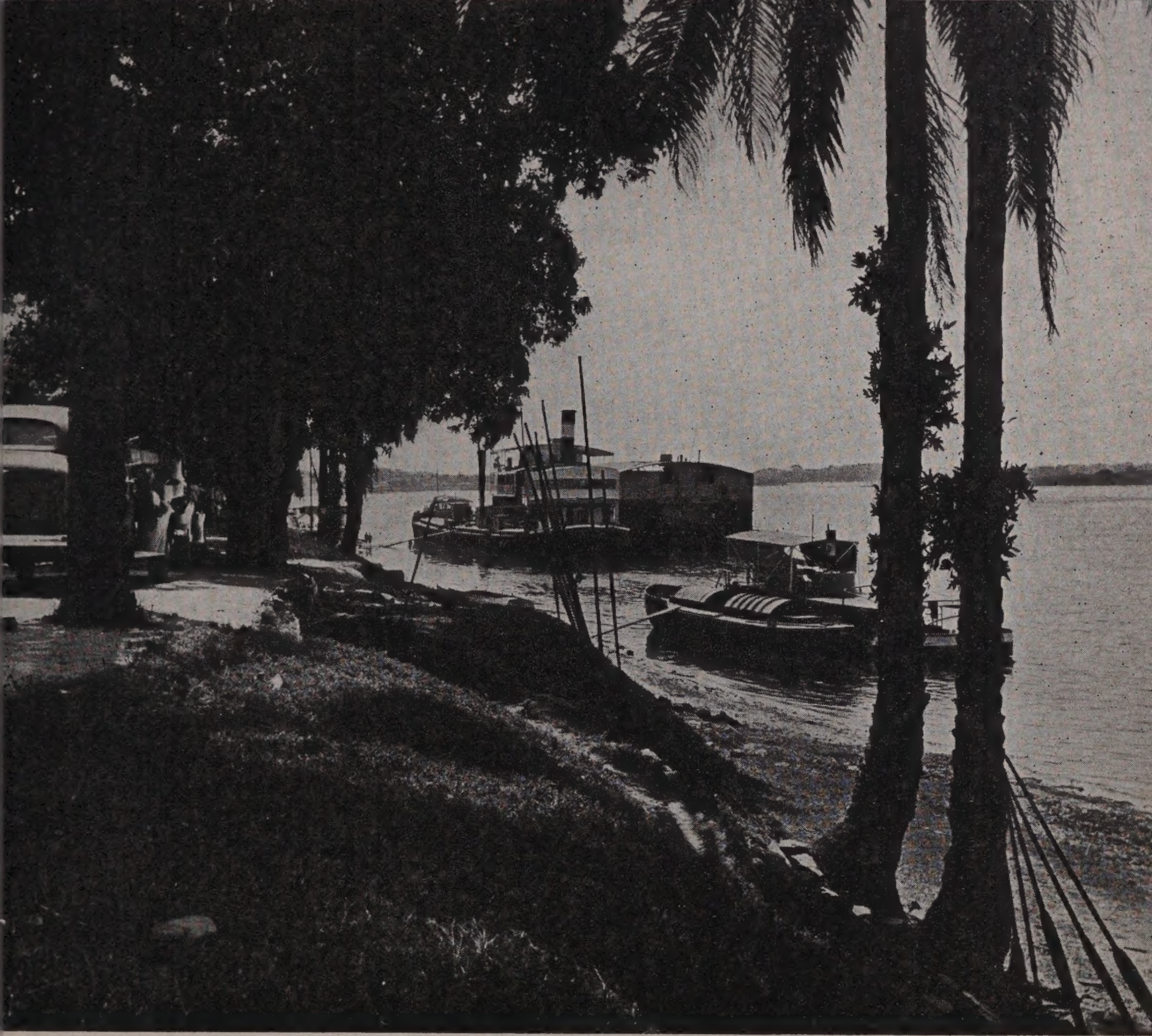
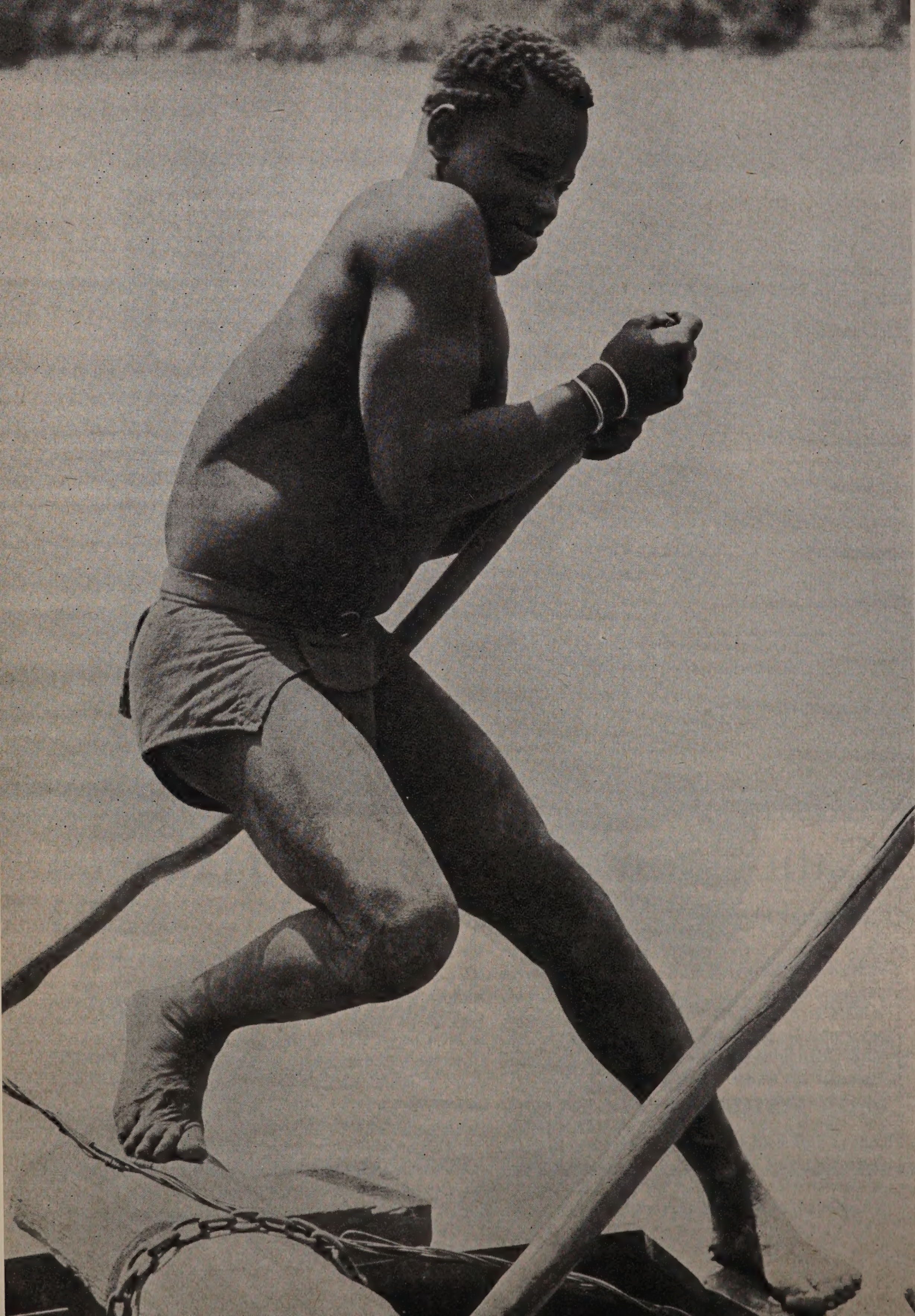
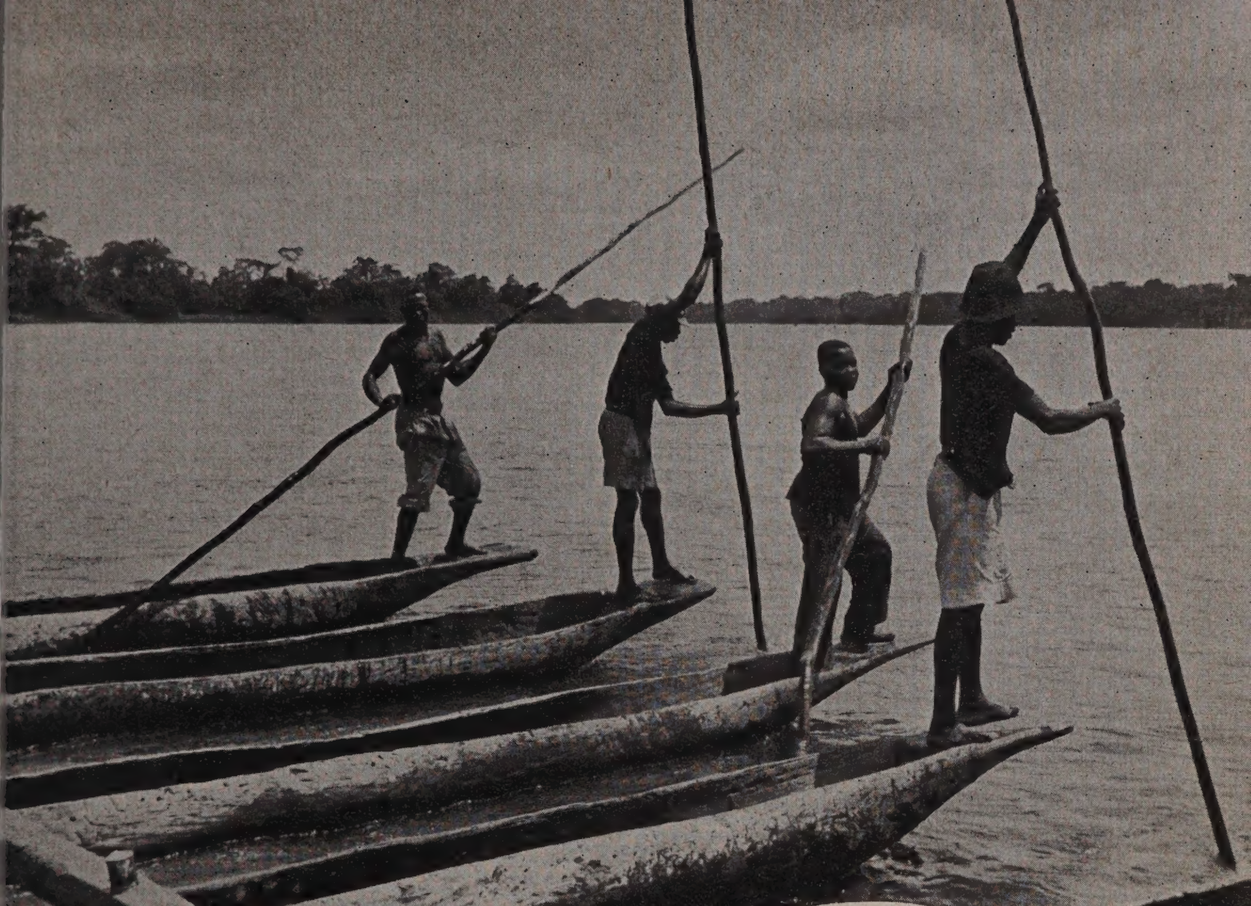


Canoes on the Congo

Notes and Photographs by MERLIN MINSHALL

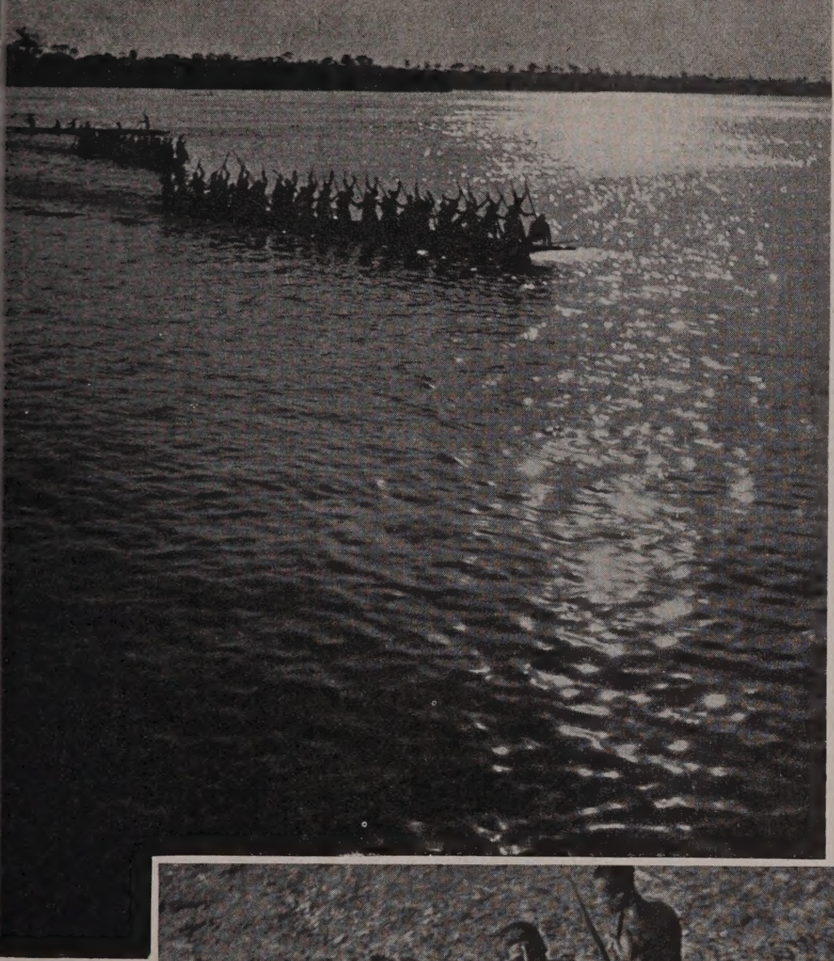
In a country where land transport is strictly limited by almost impenetrable barriers of vegetation, any navigable river inevitably becomes a main highway. The River Congo was the only way into the heart of Equatorial Africa during early days of development, and since then has remained the major supply line for feeding all Central Africa as well as being the main outlet for exports; and one can confidently predict that it will hold its own as a highway despite increased use of air transport. (Above) *A scene at Stanleyville, capital of the Belgian Congo, which might be regarded as symbolic of how much the river means to Equatorial Africa. On the left—material evidence of the influence of modern civilization on transport—are seen some of the motor-cars which have been brought in by steamer. On the river, near the left bank, is an oil tanker, without which few Congo industries could survive; and beside it is an ancient stern-wheeler, pensioned off from the Mississippi, dismantled, shipped and reassembled to perform yeoman service here. But the oldest and most general form of transport is represented by the canoe paddles in the right foreground, which play a leading role in the drama of Congo life*



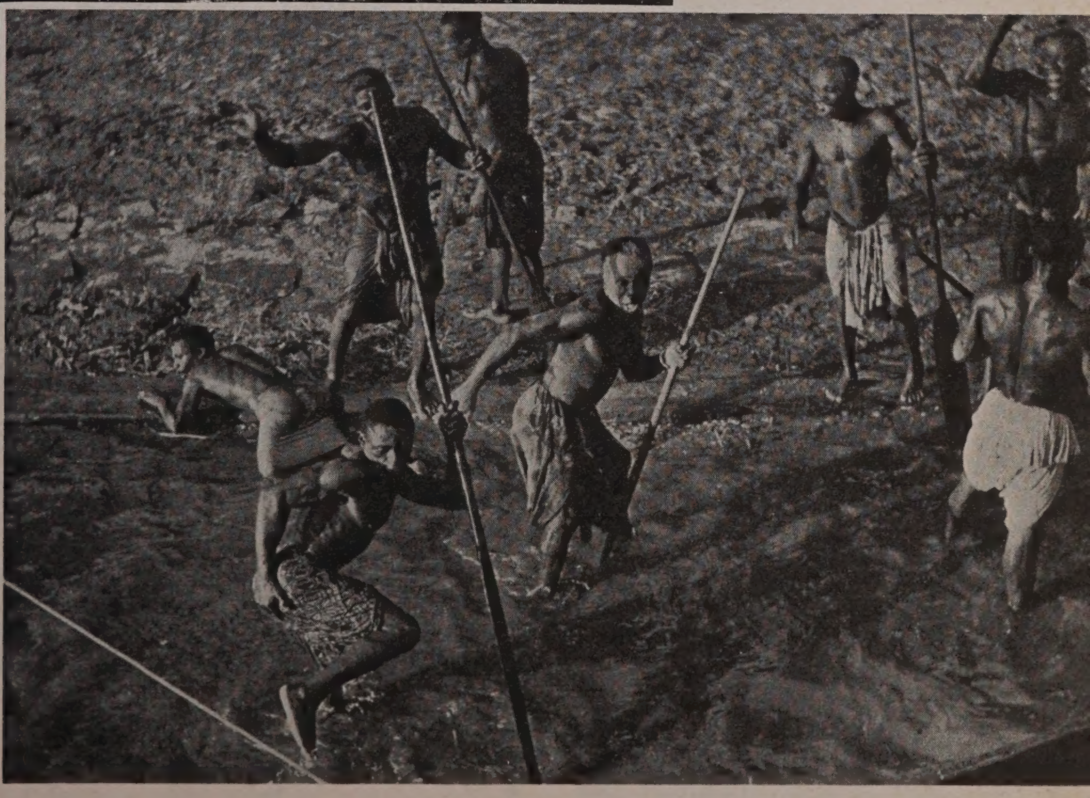


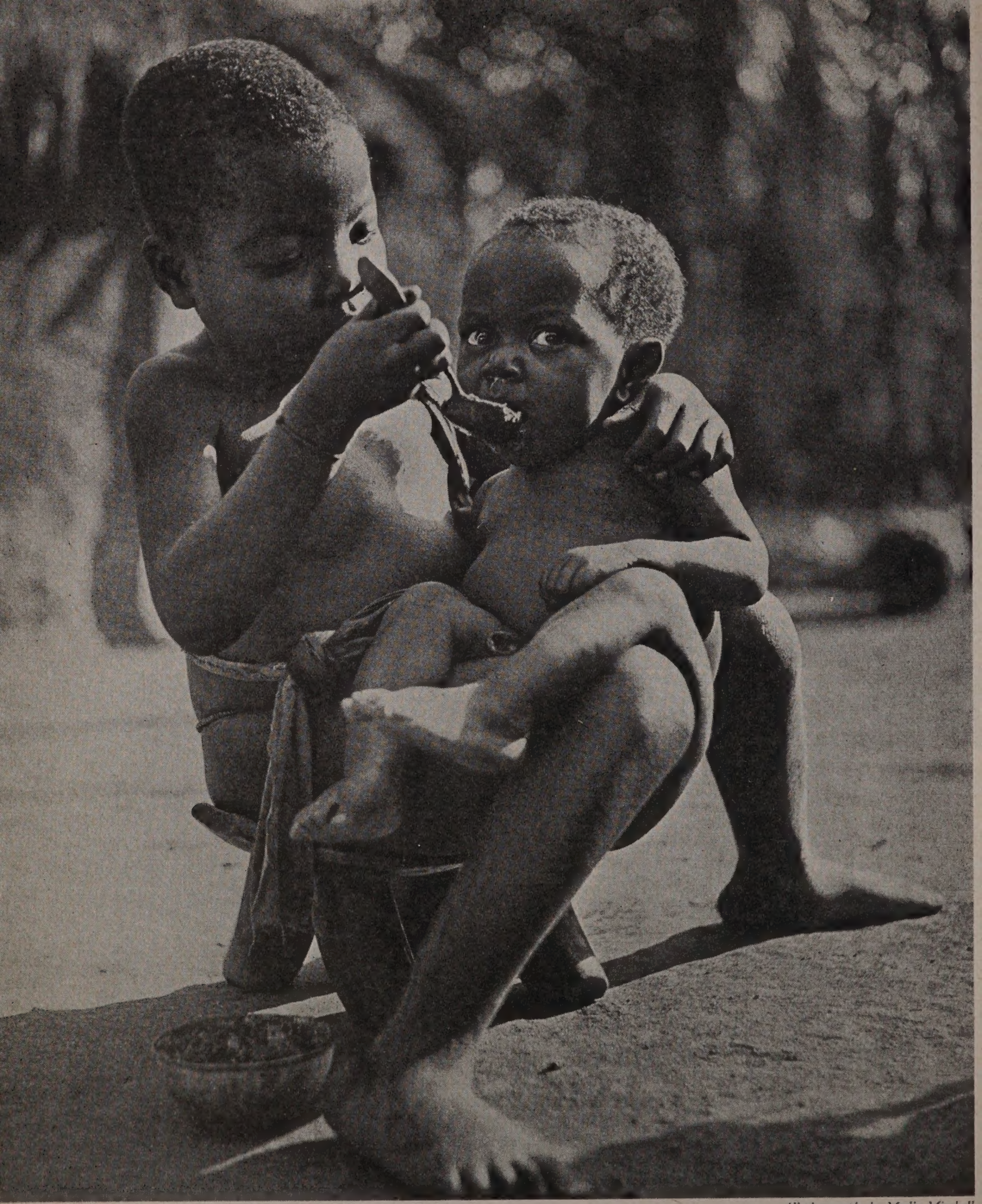
(Opposite) *A ferryman on one of the northern tributaries of the River Congo; his splendid physique, developed in spite of a diet neither rich in vitamins nor well balanced, by European standards, speaks favourably for the healthful effects of river life.* (Above) *Ferrymen balance on the gunwales of their double-ended precarious canoes with apparent nonchalance, though conscious of crocodiles lurking below.* (Right) *The entire life of the Congo river-folk is water-borne, covered canoes providing both housing and transportation*

The River Congo, near Stanleyville, on the occasion of the big canoe race, for which the onlookers (left) *turn out in festive array. At the starting point the two crews* (below) *are experiencing a phase of extreme boredom after interminable delays; having repeatedly worked themselves up to starting at the exact climax of a spirited 'canoe chorus', they have now become apathetic. But—*



—at last the race gets under way (left) *and a fascinating spectacle it affords. Two features which specially impress a newcomer are the extremely rapid 'striking' rate and the enormous crews, nearly threescore and ten strong.* (Below) *The winners treat their defeated rivals to an exhibition of frenzied and gloating exultation—a refreshing contrast to Western reserve at such times!*





All photographs by Merlin Minshall

Operation "Spooning"

Hesitation

Determination

Capitulation !

British Artists Abroad

IV. Wilson and Turner in Italy

by GRAHAM REYNOLDS

In earlier contributions to this series, Mr Reynolds has described the work of Hodges and Webber in the South Seas, Alexander and Chinnery in China, and the Daniells in India. In the following article, he illustrates the paintings made in Italy by two of Britain's greatest landscape artists

WHETHER or not the Mediterranean is the cradle of civilization, it has certainly been its nurse. Scholars and men of fashion, statesmen and poets, have constantly since the Renaissance visited Greece and Italy to come into direct contact with the background of classical life and art, the fountain-head of their own culture. With them, or in their wake, have travelled the artists of Northern and Western Europe; and because Rome outlived Athens and became the repository of the ancient world they have been particularly drawn to the Eternal City. There it was their prime purpose to study the classical marbles, in which the form and attitudes of the human body were represented in the most admired way. There, too, they sought to learn in the academies from the living stream of Italian art, and to study the work of the great painters of the Renaissance.

In this migration, which made Rome even before the 18th century the greatest international centre for artists, the travellers had their attention diverted more and more from the monuments of past art to the reality of nature in its unique Italian setting. The process began in the 16th century, for such visitors as Dürer and Pieter Bruegel retained a wistful image of the Italian landscape as part of the memories they took back with them to the North. It was at this time also that the nostalgic mood of the old ballad was born:

> Had ye seen but the white lilies grow
> On the banks of Italie

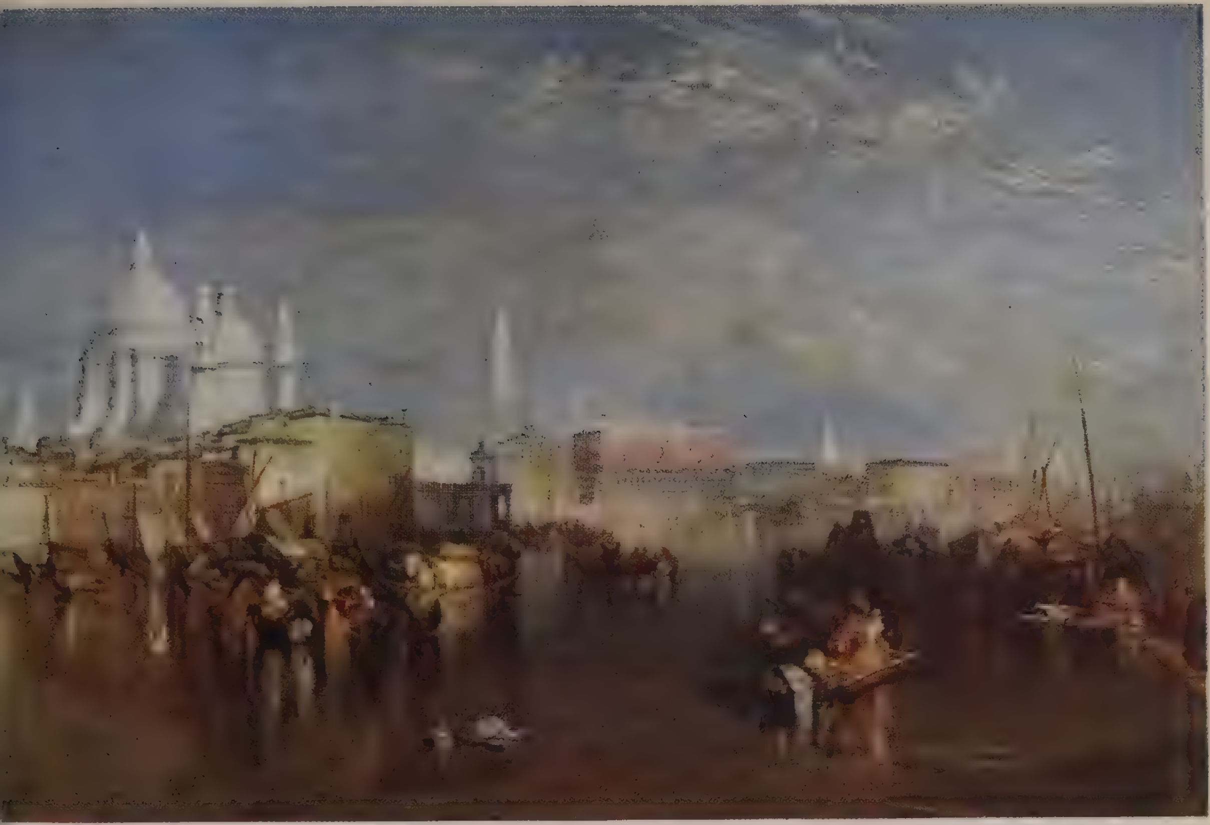
The scenery of each country has its own especial genius, and the Italian landscape combines the elements which appeal with different force to different ages and types of man. Here are to be found the sublimity of wild and precipitous mountains, enfolded in mist; here are towns, monuments, and picturesque ruins, romantic in their historical associations and in their decay; here also are the long level marshy vistas of the Campagna, bathed in an atmosphere of subtle and ever mutable light.

It was Claude who, working at Rome in the 17th century, first gave expression to these last two elements of the Italian landscape. To capture the truth of the infinitely complex light of the Campagna he worked there from early morning till late night; and his feeling for antiquity is summarized in Keats's lines:

> Charm'd magic casements, opening on the foam
> Of perilous seas, in faery lands forlorn.

which were directly inspired by the paintinn by Claude, "The Enchanted Castle". Claudg was collected with passionate enthusiasm ie England—the majority of his finest paintings are still in this country—and to the admiration felt for him can be traced the birth here of a series of great painters of the Italian scene, and great painters of the English scene.

Toward the end of the 18th century when the Grand Tour was at its grandest, it became the fashion for an artist to be attached to the retinue of an Englishman of wealth or position for the express purpose of recording the most striking scenes and antiquities visited during the journey. Richard Wilson, who went to Italy in 1750, and J. M. W. Turner, who first went there in 1819, came respectively at the beginning and the end of the most active years of this phase of fashionable travel; but they both went on their own account and not as draughtsmen to a patron. Between their visits had come the wonderful career of John Robert Cozens, who travelled with Beckford, and the more sedate achievement of William Pars and John "Warwick" Smith. In that period also the Romantic Age had fairly begun; the grandeur of the Alps had been discovered, and no one was more fitted to render that sentiment than Cozens. He understood fully how to combine the atmosphere he had learned from the paintings of his forebears—and in which he sought the mystery of the blue mists surround-



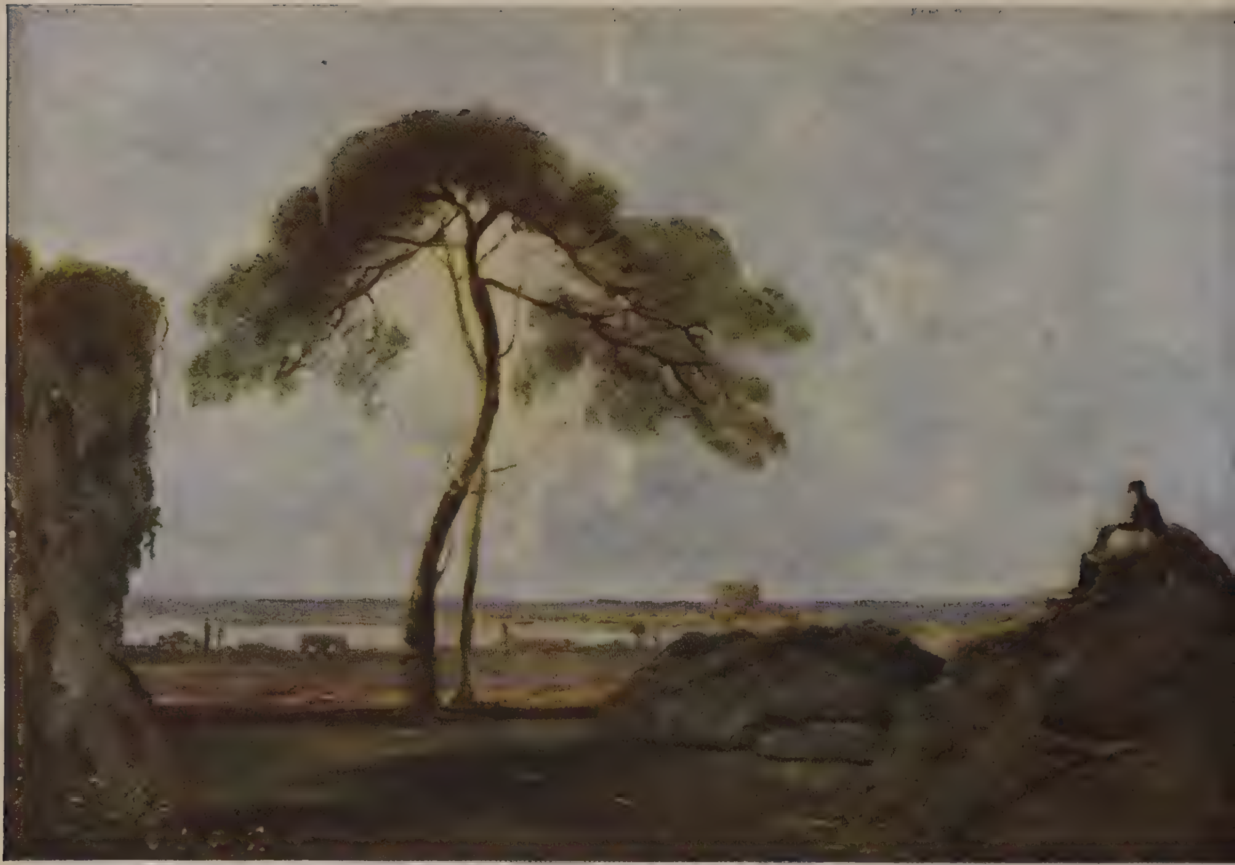
By courtesy of the Victoria & Albert Museum

Turner's painting of "Venice from the Giudecca" gives an unforgettable impression of sunlight falling on churches, palaces and the campanile, while small craft on the canal add colour and animation

ing the crags he drew—with the imputed sublimity of great and inaccessible heights. Of the artists with whom this article is more particularly concerned, Richard Wilson was the painter primarily of the Campagna and its tinted, marshy mists, while Turner is above all the painter of Venice in its glorious and colourful decline.

RICHARD WILSON, R.A.

When we have repeated the phrase that Richard Wilson was "the father of English landscape" we have recited the most significant part of what we know about him. As with many another English artist his biography was written so long after his death that there was little but doubtful anecdotes of tippling and dissipated living, and the undoubted poverty of his declining years, to build upon. We know however that his father was a Welsh parson and gave his son a sound classical education. Even the year of Wilson's entry into Italy is uncertain, but it was round about 1750, when the artist was thirty-seven years old, that he left England for the five or six most fruitful years of his life, years spent mainly in Rome. Before he left England he was probably better known as a portrait painter, but contrary to former belief he had already painted a number of excellent naturalistic English landscapes and topographical scenes—portraits of places, as it were. Once established in Rome, however, his future course was settled; he painted few portraits thereafter. Instead he devoted himself, as Claude had done before him, to painstaking study and sketching in the Campagna. Pictures by him which are extant show that he went to a great number of famous scenes —Tivoli, Hadrian's Villa, Pozzuoli, Lake Albano, Castel Gondolfo. He is said to have had a marked fondness for the neighbourhood of Subiaco. In addition to paintings of these and other Italian subjects he made many drawings of the landscape itself or used it as a background to scenes from mythology or poetry. A book of studies and designs done in Rome in the year 1752, with the address Caffé delli Inglesi, is preserved in the Victoria and Albert Museum and bears testimony to



From the Nettlefold Collection, by courtesy of Adrian Bury: "Richard Wilson, R.A.: The Grand Classic". (F. Lewis)

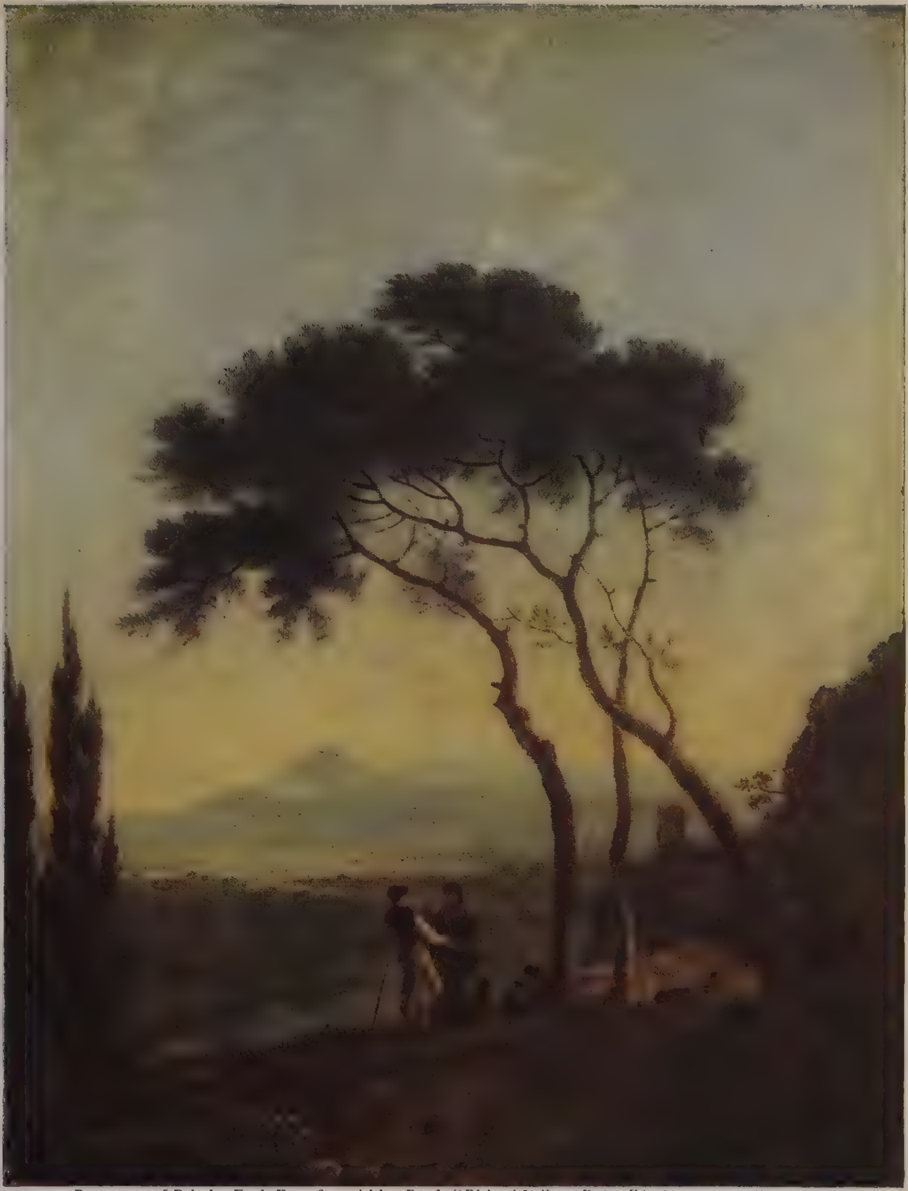
Richard Wilson probably painted this scene near the mouth of an Italian river in early morning. The tree in the centre forms the focus of a countryside bathed in delicate light and atmosphere

his assiduous study and the care he took to find in each separate landscape motif the composition of a finished picture. The scenes in this book include Vesuvius, the King of Naples' garden at Portici, Herculaneum, Sermonetta; and one is facetiously labelled "Villa Vilsoniania". In all of these drawings, however sketchy, we must admire the way in which he finds in a shapely tree or a ruin the focus for a fresh vision of what may often seem in its mere lines a monotonous, never-varying landscape. And to this great strength of construction is added in his painting his understanding and assured rendering of the atmosphere, whether the cold virginal light of the early morning or the rich mellow tones of the evening which transmute but do not conceal the far distances.

That the direct open air studies which went to his mastery sometimes led Wilson into wild and barbaric places is proved by the story of how, when he was painting Castel Gondolfo, he was thought by the peasants to be in league with the devil because a thunderstorm came on suddenly. "He was in danger of being put to death by them 'for the love of God' had he not been rescued by one of their priests who had some knowledge of painting."

Wilson returned to England after a brilliant and prosperous career of some five years in Rome. He scarcely painted a portrait thereafter, but he set to work to paint the English landscape as he had painted Italy. Snowdon and Cader Idris were obvious outlets for him and he extracted from them the full romantic feeling; but he had the gift of finding that same serene but deep emotion in the valley of the Thames, no farther from London than Richmond, Twickenham or Kew. As well as these new subjects he painted variations or new versions of his Italian scenes which showed no falling off in his memory of those halcyon days. But the result for him personally was disastrous; his declining years are a lamentable tale of moves to cheaper and cheaper lodgings and of his bitter question to

Wilson, the father of English landscape painting, found his inspiration in such Italian scenes as this, which represents the Vale of Narni. Combining the scenic splendours of the landscape with a feeling for the classical past, Wilson infuses a deep sense of tranquillity entirely his own



By courtesy of Brinsley Ford, Esq., from Adrian Bury's "Richard Wilson, R.A.: The Grand Classic". (F. Lewis)

a young painter many years his junior: "Do you know anyone mad enough to employ a landscape painter?" Constable, always the most generous and perceptive critic of his predecessors, gave him his due—"Poor Wilson: think of his fate, think of his magnificence". And Constable also expressed most fully the quality of his paintings when he wrote: "I recollect nothing so much as a large, solemn, bright, warm, fresh landscape by Wilson, which still swims in my brain like a delicious dream". Of these epithets we may single out "solemn" as the most significant, for it is Wilson's solemnity which is his most strongly marked characteristic and which differentiates him above all from the orgiastic riot of Turner's later work.

J. M. W. TURNER, R.A.

Turner did not pay his first visit to Italy until 1819, when he was forty-two years of age. It was not his first visit to the Continent, for he had visited France and Switzerland in 1802 and had carried out a memorable tour of the Rhine in 1817. In a sense he was familiar with Italy already for he had a vast knowledge of Claude's paintings and had painted, in direct emulation of that master, variations upon his scenic themes. Just before Turner's departure a letter was addressed by Sir Thomas Laurence to Farington in which he brings out both Turner's relationship to Claude and his feeling that he was predestined to paint in Italy:—

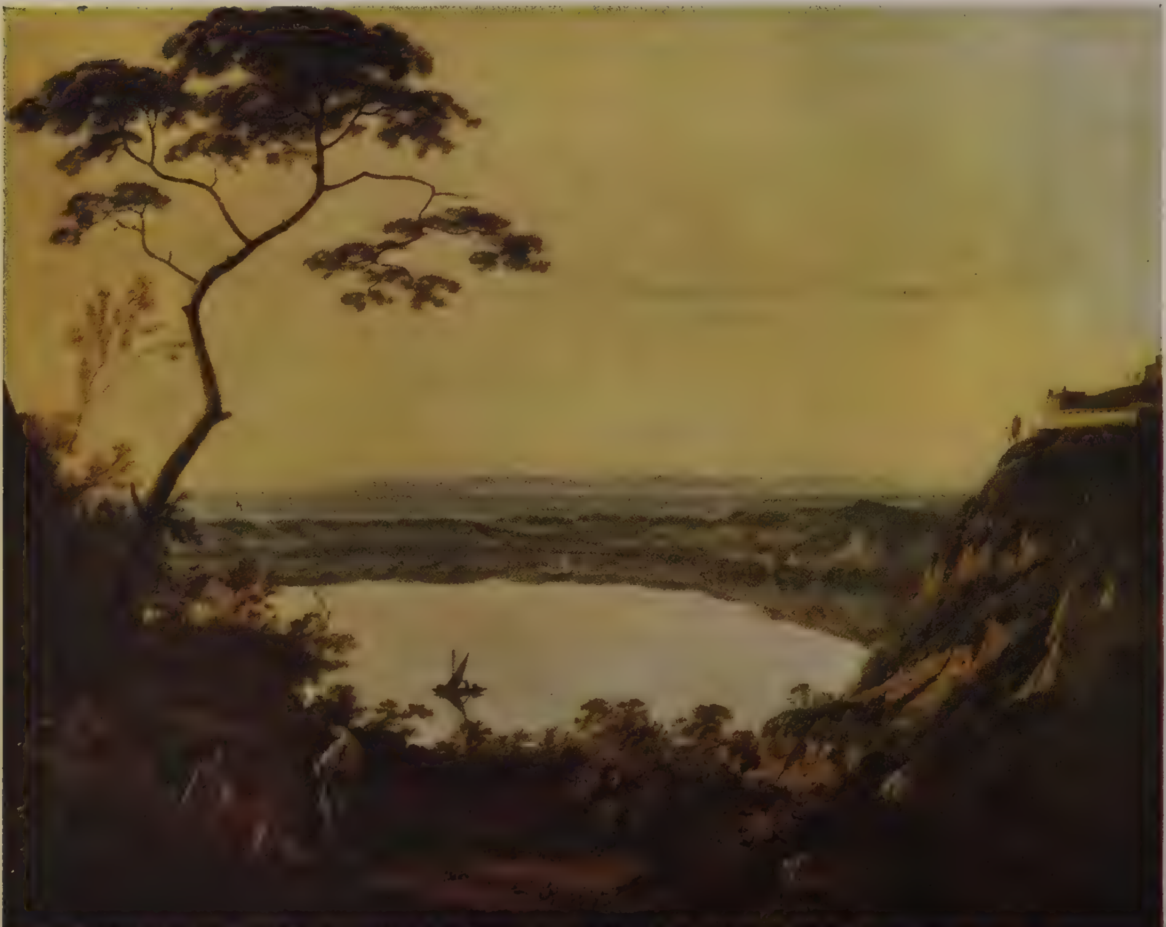
> Turner should come to Rome. His genius would here be supplied with materials and entirely congenial with it... He has an elegance, and often a greatness of invention, that wants a scene like this for its free expansions; whilst the subtle harmony of this atmosphere, that wraps everything in its own milky sweetness . . . can only be rendered according to my belief by the beauty of his tones . . . It is a fact that the country and scenes around me, *do* thus impress themselves upon me; and that Turner is always associated with them; Claude, though frequently, not so often; and Gaspar Poussin still less.

So Turner went to Italy: he visited Venice, but spent longer in Rome and its neighbourhood. A pleasant glimpse of him on a later visit to Rome comes from the letter of a fellow-traveller who had never heard of the artist.

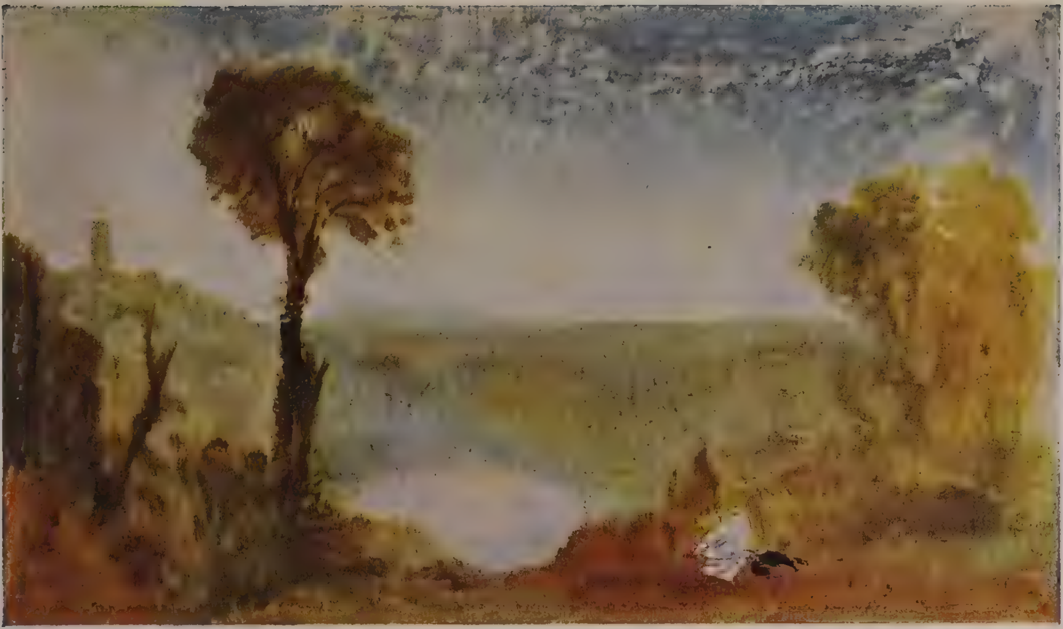
> I have fortunately met with a good-tempered, funny little, elderly gentleman . . . He is continually popping his head out of window to sketch whatever strikes his fancy, and became quite angry because the conductor would not wait for him whilst he took a sunrise view of Macerata. "Damn the fellow!" says he. "He has no feeling". . . His good temper, however, carries him through all his troubles. I am sure you would love him for his indefatigability in his favourite pursuit. From his conversation he is evidently *near kin to*, if not *absolutely*, an artist. Probably you may know something of him. The name on his trunk is J.W. or J.M.W. Turner!

But he had already passed the stage of being only a topographical draughtsman. He

Lake Nemi, sheltered from the wildest winds, was called the Mirror of Diana in the ancient world. Wilson's solemn and elevated treatment is in harmony with the calm of this gem of the Alban Hills



By courtesy of the National Museum of Wales, from Adrian Bury's "Richard Wilson, R.A.: The Grand Classic". (F. Lewis)



By courtesy of the Trustees of the Tate Gallery

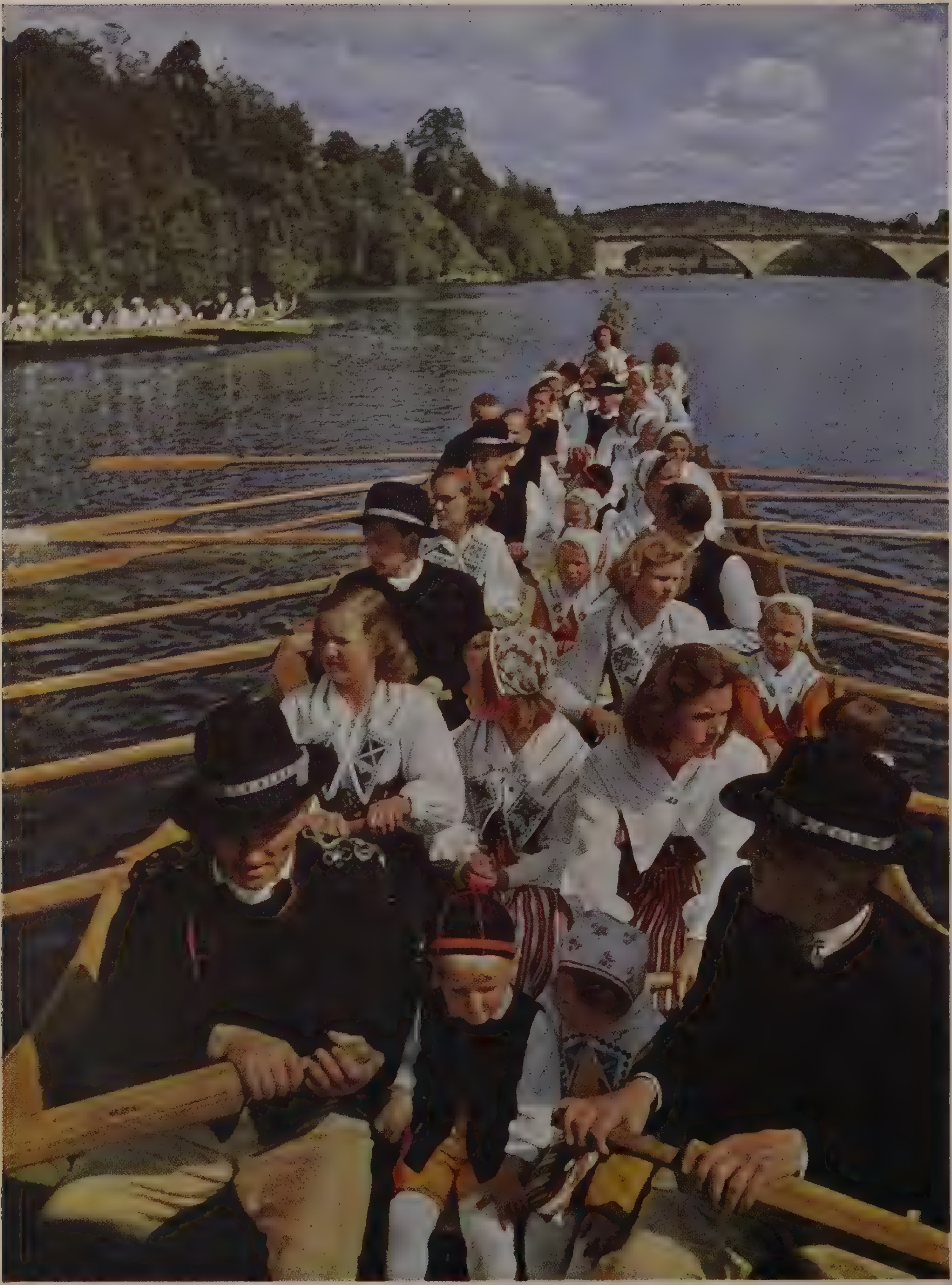
Turner's vision of Lake Nemi, fiery and romantic, contrasts strikingly with Wilson's, and lends support to Constable's assertion that he painted "with tinted steam, so evanescent and so airy"

was best able to use this material when it had lain dormant in his mind for some years; then he could adapt it and adjust it at will, and produce paintings in which the imagination had transformed what he had seen so many years ago. In place of literal accuracy he then painted with topographical truth. Thus it was that the oil paintings with Italian themes which he exhibited shortly after his return to London were not wholly satisfactory. Then, suddenly, thirteen years after his return, he started painting pictures of Venice. The immediate cause of this revivified interest seems to have been that Turner had been reading the fourth canto of Byron's *Childe Harold* which on its publication in 1818 had dramatically put Venice on the map with its evocation of splendour in decay.

> In Venice Tasso's echoes are no more
> And silent rows the songless gondolier;
> Her palaces are crumbling to the shore,
> And music meets not always now the ear;
> Those days are gone—but Beauty still is here.

This, with Roger's poems, quickened Turner's recollections, and having painted Venice again he resolved to visit it for a second time. Five years after this visit of 1835 he exhibited his "Venice from the Giudecca" which is reproduced with this article and is the most famous and dazzling of his paintings of the city. It does indeed sum up the whole violence and brilliance of the Romantic vision of Venice. The riot of colour, the opulence of picturesque shipping, the wonderful background held in its haze of heat, even the airless sultriness, are here discovered and gorgeously portrayed.

On pages 52 and 53 are reproduced two paintings of the Lake of Nemi, one by Wilson, the other by Turner. They provide a direct comparison between the temperaments and styles of the two men. Lake Nemi was called the Mirror of Diana in the ancient world, because even the wildest winds seldom ruffle its surface, and near at hand is the grove sacred to Diana in which grows the Sacred Bough. In each painting the calm level lake gleams like a jewel; but Wilson has given it a grave and solid setting, lit by the long shadows of the declining sun. In Turner's rendering—a work of his latest and freest years, the solidity of the earth seems to have fused back into its original fire. Between two paintings of such completeness and integrity we are not called upon to single out one or other as the greater. Wilson's was conceived in the youth of the Romantic movement, when men were first becoming conscious of the feelings aroused in them by the most superb works of Nature, and took them rather seriously and solemnly. In Turner's maturity men abandoned themselves almost without measure to the intensity of their feelings, and his later work was an adequate vessel for containing the immensity of that response.



All Kodachromes and photographs by the author

(Above) *Long boats are rowed to Leksand for the Midsummer Festival by people from the villages nearby*
(Opposite) *Old and young taking part in the festival are gaily clad in costumes of traditional design*

Midsummer Festival in Sweden

by J. ALLAN CASH, F.I.B.P., F.R.P.S.

SWEDEN's Midsummer Festival is a truly joyous affair; it has survived modern times admirably and is conducted today with an enthusiasm that has lost nothing with the passing of years. The ceremony varies in detail from one part of the country to another, but there is no better region in which to see it than Dalecarlia, now more often known as Dalarne. Here the best costumes are worn, while the setting for the festival, on the wooded and hilly shores of Lake Siljan, is as fine as could be found anywhere.

I made my way to Leksand, in Dalarne, for the particular purpose of seeing the Midsummer Festival, and of photographing it in colour if

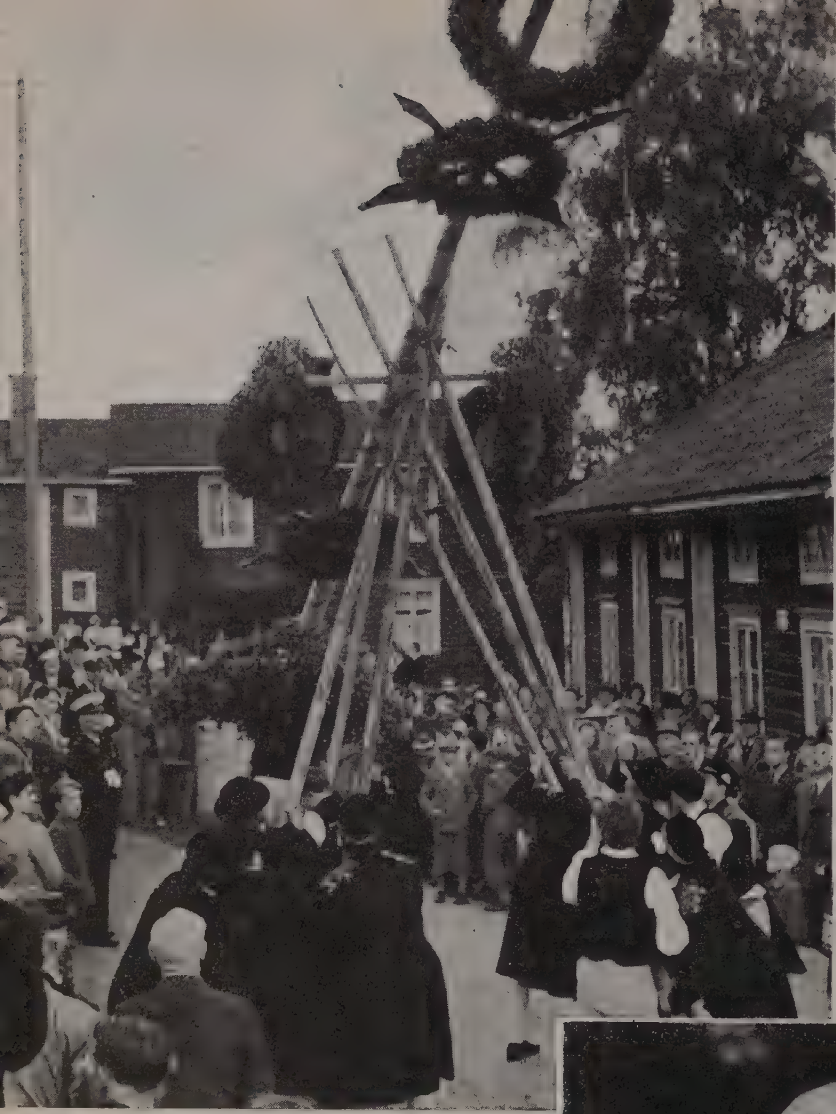
(Above) *Dancing outside a Swedish farm building during the Midsummer Festival. The violinists who provide the accompaniment, skilled local musicians, never appear to tire of playing the lilting tunes of Swedish folk dances—tunes which linger in one's mind long after the event.* (Left) *In an interval between dances one of the musicians chats with his sweetheart, whose young sister seems to relish the role of chaperone* the weather proved kind. I was lucky, for the few days round the longest day of the year were blessed with the most perfect summer sunshine. The ceremony takes place in different villages over a period of three days, so that what I missed in one place I saw in another. Sometimes it is an evening affair, which goes on until the early hours of the next morning. (One cannot say "until after dark", because in Sweden it never becomes completely dark at this time of year.)

Briefly, the ceremony consists of decorating a maypole (it is called that in Sweden and certainly corresponds to our own); then raising the pole to a vertical position, and dancing round it. This may take place on the village green, in a handy field, or in the square or main street of the village. Rättvik is a favourite place, but so many visitors are in the habit of going there that the festival is tending to become a little commercialized. At Leksand it is still carried out in the traditional way, uninfluenced by the many visitors who come to watch and to take part in it.

One evening a great procession formed on the green at Leksand and marched three miles to the little village of Tibble. Here the pole was being decorated with hearts and crosses and other emblems made from green leaves, each emblem having its own particular meaning—such as fertility, prosperity, or good crops; and it was some time before all were firmly fixed in place. Next, pivoted between two stout uprights and levered aloft in the crotch of long timber supports lashed crosswise, the maypole was gradually raised into position by the men of the village. At each heave there were great shouts and cheers from the crowd, with a particularly deafening one as the pole reached a vertical position. Then the fiddlers, who had marched from Leksand at the head of the procession, playing all the way, struck up some of the lovely lilting airs of Swedish folk dances. As the last golden beams of the slowly setting sun gilded the roof tops, the village square became a mass of whirling figures, dancing with the carefree abandon of a happy people.

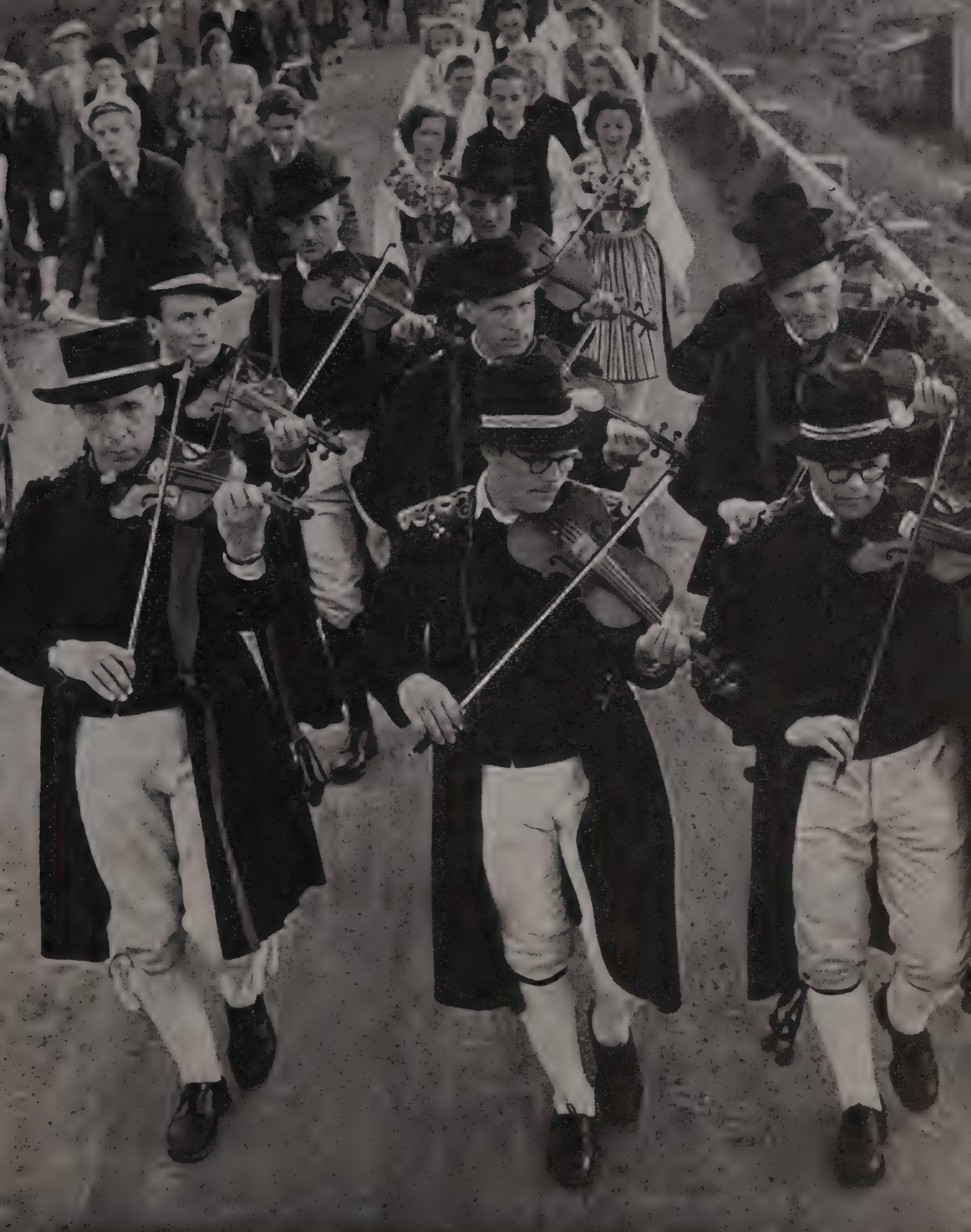
On the Sunday at Leksand a particularly beautiful ceremony took place. Long boats

An absorbed crowd watches as the maypole, prior to erection, is decorated with various emblems made of leaves and branches; each has a particular significance, such as fertility or prosperity



(Left) *A highlight of Sweden's Midsummer Festival is the raising of the maypole. Pivoted between two uprights and levered aloft in the crotch of long timber supports lashed crosswise, it is gradually raised into position, heave by heave, to the—*

—accompaniment of cheers from the crowd, with a particularly deafening one as it reaches a vertical position. Soon now the maypole dancing will begin, and at least one young lass (right) *is smiling in eager anticipation of the approaching ceremonies*



A procession of men, women and children on their way to participate in the Midsummer Festival. In car and cart, on bicycle, horse and foot, villagers in carefree holiday mood follow in the footsteps of the fiddlers

The climax of Sweden's Midsummer Festival: participants dance round a maypole with joyous abandon

filled with gaily costumed people from villages across the lake entered the mouth of the river. It was a morning of dazzling sunshine with little white cotton-wool clouds floating in an intensely blue sky. As each boat came into sight, the people were singing, often accompanied by a fiddler. The beautifully blended voices, rising and falling in the soft summer breeze across the water, created the very essence of melodious song. As the boats came in to the little jetty one by one, the people stepped ashore and formed a procession. The wooden church, high up above the river, is painted white and looks slightly Russian. The service was rather long, and I confess that I spent part of the time sitting in the sun in the wooded churchyard.

As the people came out after the service, they formed a brilliant, moving mass of colour, milling round the church and then slowly drifting up the broad, tree-lined road to the village. Here, indeed, in this brilliant sunshine, one could admire all the lovely shades of the widely varied costumes. There is a particularly rich yellow worn by both sexes, and especially the children. The people are very proud of their costumes and keep them from year to year with the greatest care. The many differences are said to have some significance, but I found no one who could explain what this was. It is impossible to tell who is who at the time of the Midsummer Festival. Everyone comes out in costume, and to the stranger the rich man of the village looks no grander than the local street-sweeper, his lady no finer than the wife of a farm worker. There is a splendid air of true democracy and a complete absence of snobbery. For this spirit, for its gaiety and its beauty, Sweden's Midsummer Festival will be remembered for many a long year as one of my happiest experiences.

Geography and Air Navigation

by FLIGHT LIEUTENANT I. L. DUNN

MOST of us will agree, at first thoughts, that the sciences of Geography and Air Navigation are closely related. On further study, however, few practical air navigators will realize just how closely related they are. This is not surprising, since during training the present-day navigator is taught only the essentials which will enable him to direct an aircraft safely from A to B. This concept of the contemporary air navigator could only be accepted, perhaps, when A and B are, say, up to a few hundred miles apart. We should then be quite justified in accepting a navigator for operational service when he had learned the rules of thumb: dead reckoning, including the triangle of velocities, wind finding and simple proportion; map reading; the operation of his instruments; and the rules of airmanship. We may still be justified in accepting practical air navigators trained to those standards if all we want is someone to be on hand to tell the pilot the position, which course to steer, and at what time the aircraft is expected to arrive at its destination.

No one will doubt the fallacy of such a policy. We must forget the narrow definition of air navigation and accept the science in its widest application. Not only does air navigation define the technique of getting one aircraft from A to B; it covers the planning of the world's air routes, and the control of aircraft on these routes. In both the Royal Air Force and the Royal Navy this broad concept of air navigation has been apparent for some time, as was witnessed by the amalgamation, in both Services, of their Navigation and Control branches.

In December 1945 Lord Rennell, in an article in *The Geographical Magazine*, reviewed the directions in which geographical exploration may be expected to develop. He made the claim that navigation, whether by sea or air, was one field in which geographers are capable of making a useful contribution. Provided, then, that we view air navigation in its broadest aspect, along what lines can we expect geographical research and development?

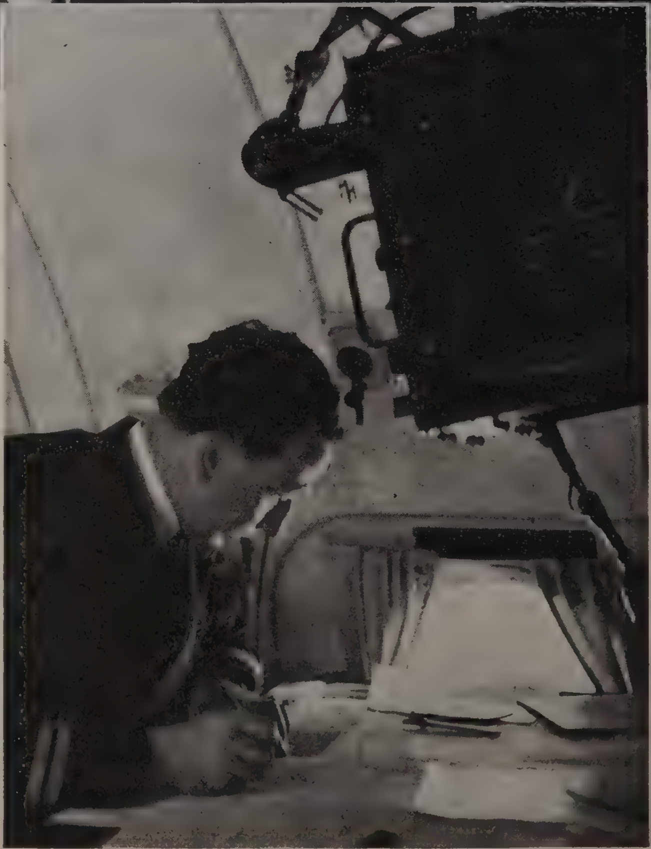
It is obvious that marine navigation is to a great extent affected by geographical considerations, since a ship can proceed in one direction only until it strikes land. It is less evident that the same thing applies to aircraft, since in theory an aircraft can proceed indefinitely in three dimensions. The 'ideal' aircraft has, however, not yet been built, and the main limiting factor of existing aeroplanes is their range. The range depends not only on the amount of fuel they can carry, but on such considerations as height, weather conditions and safety factors.

WEATHER, SPEED AND COMFORT

In these days, when the world's future long-range air routes are in the planning stage, it is accepted that, after safety, speed combined with comfort is the main consideration. This can only be achieved after detailed study of the weather conditions at varying heights all along the route. To achieve high speeds is not purely a problem for the aircraft designer. When the top speed of an aircraft is given it is worthless unless accompanied by an appropriate height. A knowledge of this height—and hence the density of the atmosphere at flight altitude—is important since the true airspeed of an aircraft depends upon the density of the air in which it is flying. If our aircraft chooses to fly in a more dense atmosphere than that quoted—that is, fly at a lower altitude—then our top speed will be substantially reduced. Similarly, if the aircraft flies in a less dense (higher) atmosphere, the true airspeed will be increased. To achieve speed, then, it is apparent that we must fly high. . . . How high?

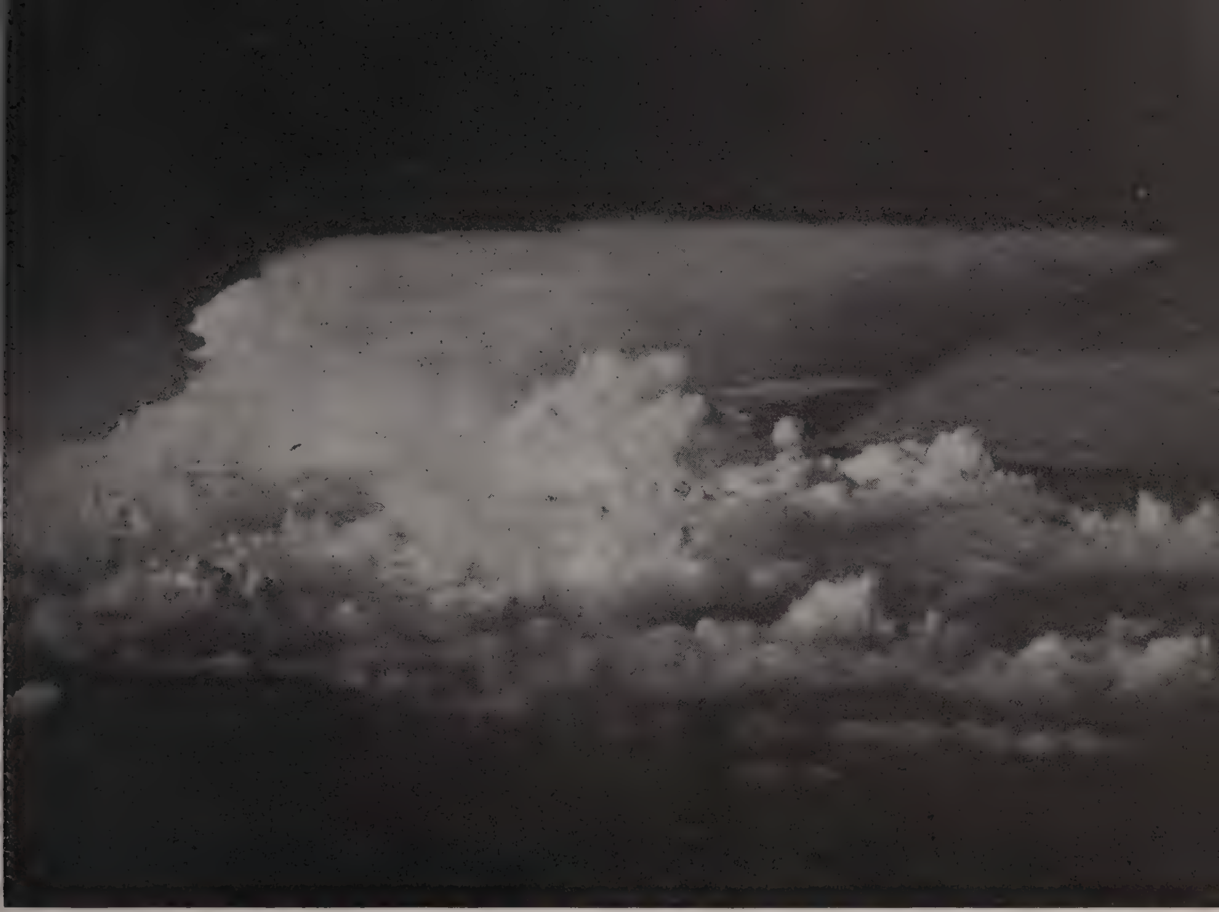
For the sake of example let us assume we are to fly from the United Kingdom to North America, a distance of, shall we say, 3000 miles. Using the average density over a period of years for the heights 35,000, 25,000, and 20,000 feet, we calculate our true airspeeds for these heights to be 300 m.p.h., 280 m.p.h., and 200 m.p.h. If there were no other considerations it is obvious that 35,000 feet would be our chosen height. Take a closer look, however.

Over the North Atlantic the prevailing winds are westerly in character. As height is increased they become more pronounced in a westerly direction, and the speed increases. In winter at 35,000 feet, for example, we would not be far adrift at any time to say that the wind will be due west at about 100 m.p.h. For other heights, even though the 'true' wind may not be due west, the meteorologists tell



The accompanying photographs illustrate different phases in a navigating officer's routine. (Above) *The instrument is an astro compass, used for taking sights on heavenly bodies and checking the accuracy of the aircraft's compasses. It is fixed to a rigid mounting in the astro dome, through which all sights are made. On the card in the rear is tabulated the correction to be made for refraction of light rays passing through the curved astro dome.* (Right) *A navigator at work in a B.O.A.C. Constellation aircraft used on the North Atlantic route. On the plotting table are his protractor, dividers, parallel rule, chart, and course and airspeed computor. The radar navigation set (side view) can be seen at the top right-hand corner*

B.O.A.C. official photographs



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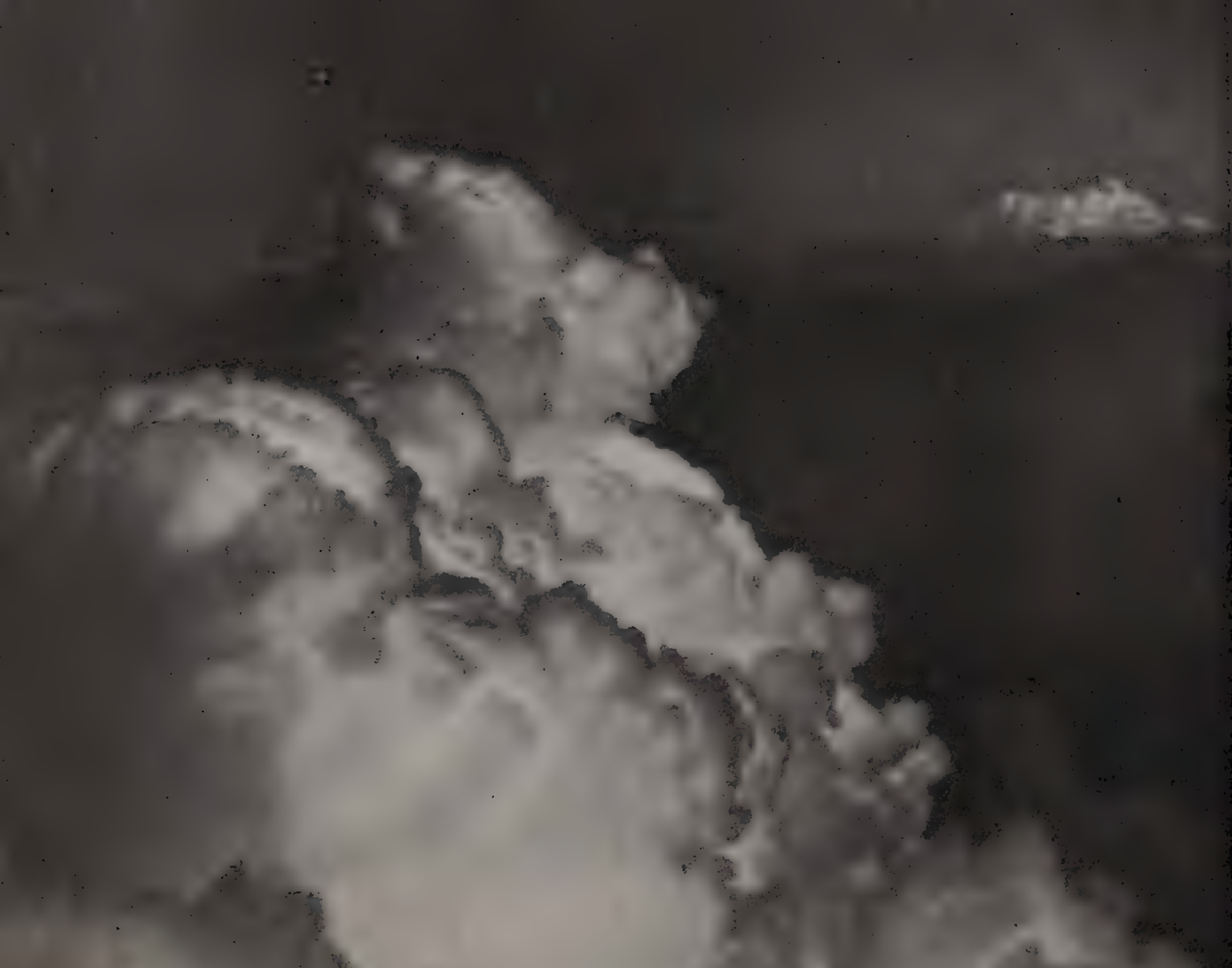
Cumulo-nimbus cloud, with characteristic anvil-shaped top; its base usually extends from about 1000 to 2000 feet. This is the real thunderstorm cloud, formed by extra violent upcurrents of air, and there is always precipitation from it in the form of heavy rain or sleet, hail or snow

us that it is quite likely that the westerly components of the winds at 25,000 and 20,000 feet would be of the order 60 m.p.h. and 50 m.p.h. respectively. Assuming now that our course is due west, it will be seen that at all heights we are faced with a headwind, resulting in our groundspeed being much lower than our airspeed. In point of fact our groundspeed is: at 35,000 and 20,000 feet, 200 m.p.h., and at 25,000 feet, 220 m.p.h. This means that if we fly at either 35,000 or 20,000 feet the flight will take us fifteen hours, whereas by flying at 25,000 feet it will be possible to save approximately one and a half hours.

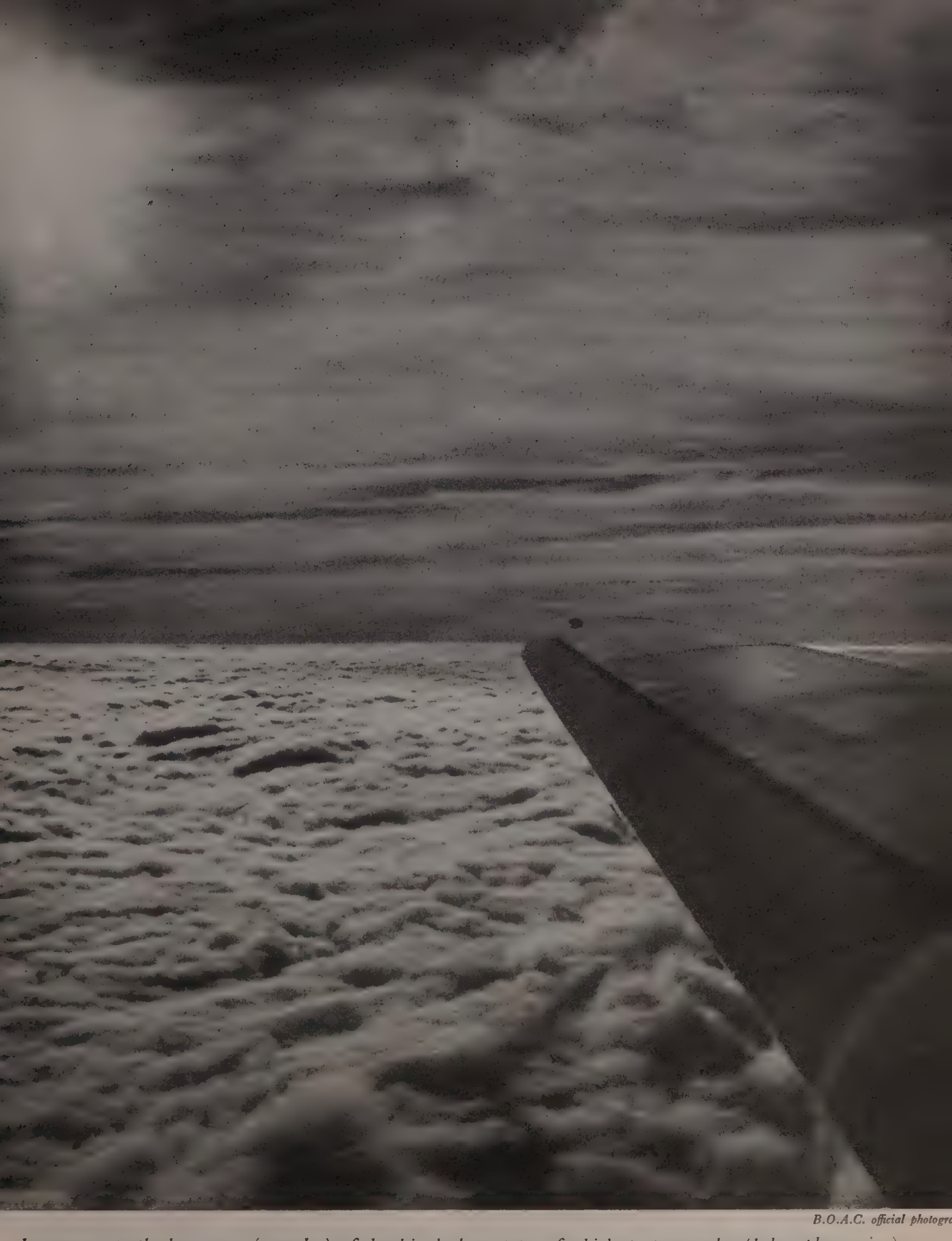
It has been said that speed is an important factor—so also is comfort of travel. The optimum speed is obtained by a judicious combination of height and wind factors. Comfort is obtained by a 'weather at altitude' combination.

In the lower layers of the atmosphere turbulence is always present to some degree. The amount of turbulence depends on the vertical motion of air. Factors liable to vary this vertical air motion, or uplift, are the amount of surface heating due to the sun, and the contours of land masses. On very hot days, when the surface heating is great, there are likely to be violent upcurrents of air, hence turbulence; and aircraft flying in the lower layers (up to about 10,000 feet) are liable to have rough passages. Similarly, on occasions when there is a strong surface wind, any obstacles—such as mountain ranges—are liable to cause violent up and down currents. If it is comfort we want, then again we must fly high. One of the most stable airstreams is to be found just above a formation of layer cloud (e.g., strato-cumulus). In general it may be said that stable conditions will be found on almost all occasions above 10,000 feet. A noticeable exception to this is in the region of heavy cumulus or cumulo-nimbus (thunderstorm) cloud. These clouds are



Alfred G. Buckham

Heavy cumulus cloud; like cumulo-nimbus, this is formed in an unstable atmosphere. It occurs most frequently in Great Britain when there are northerly or north-westerly airstreams, which bring down cold, clear polar air over the country. Upon entering such a cloud as this, an aeroplane would experience severe buffeting



B.O.A.C. official photogra

In contrast to the heap type (cumulus) of cloud is the layer type, of which strato-cumulus (below plane wing) is a very common form, usually occurring in Great Britain with south-westerly airstreams, which bring moist, warm air from the tropics. Above it is a stable layer that affords the most comfortable flying conditions caused by extra-violent upcurrents of air, and they usually reach to a height of approximately 20 to 25 thousand feet.

THE GROUND AFFECTS THE AIR

The form of the earth is most important to the air navigator. This fact is obvious when one thinks of the airline navigator flying the world's air routes. He must be conversant with the topography of the country over which he flies. He must learn to recognize his position in terms of well-known headlands, peculiarly shaped hills, and the pattern of rivers and lakes. In short, he must be a proficient map-reader.

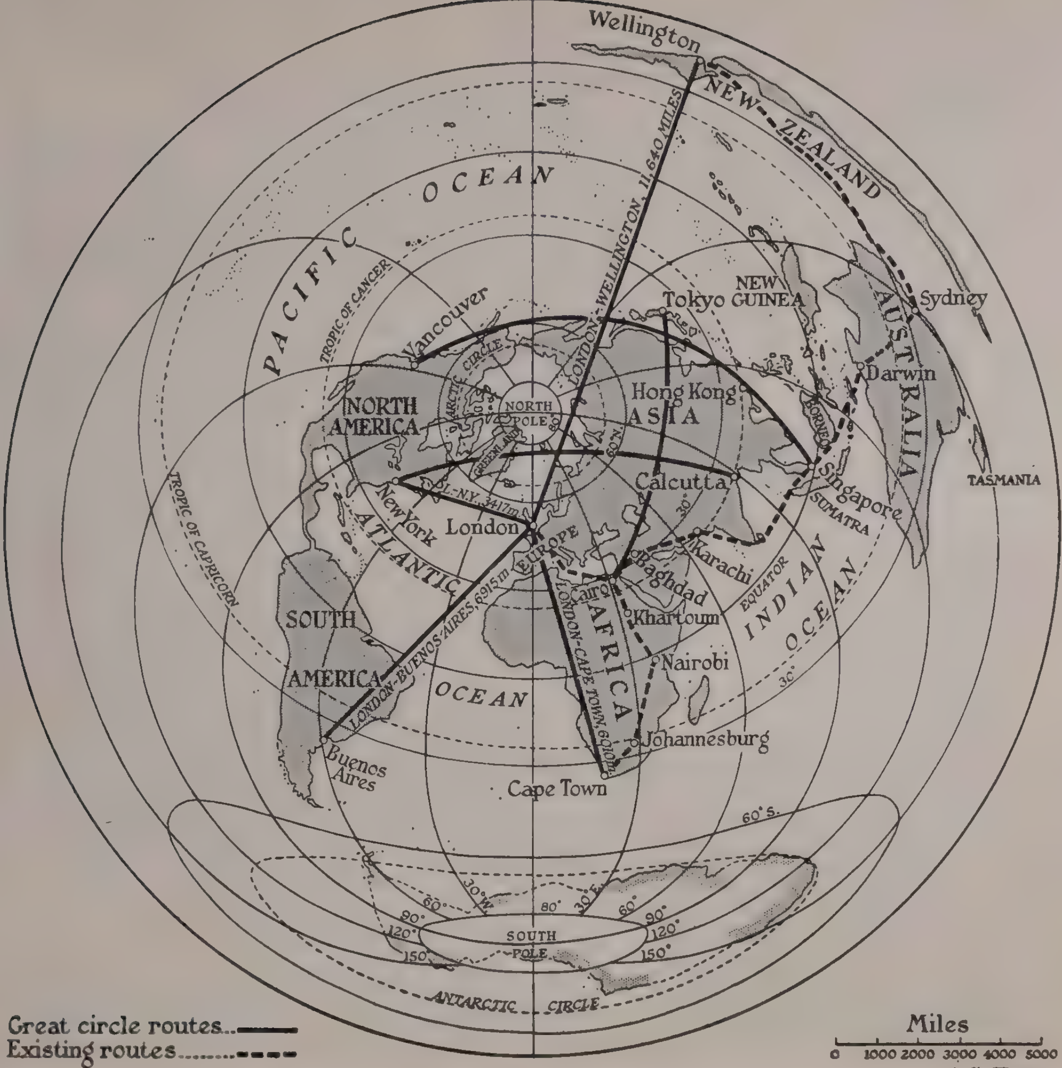
Taking a more general view of the earth's surface, it is essential for the navigator to study the shape (area and topography) of all the world's land masses, and their location in respect to the oceans which surround them. This study is important not only for the obvious reasons that influence the planning of a route dependant on these factors, but also from the meteorological (climatic) standpoint.

Since the tendency of modern and future airliners and military flying will be to follow great circle (shortest distance) routes, the local geography of many remote parts of the earth will become increasingly important. A glance at a map showing existing airline routes, as compared with possible ones of the future, will show that whereas the former follow well-known routes between important civic centres, the latter traverse vast expanses of comparatively unknown territory. Many important issues are therefore uncovered. The first is that all those areas which are at present only sketchily surveyed must be accurately mapped. This is not always possible by air alone. The slower but more exact ground surveys may have to be undertaken. In other cases, where aerial survey might suffice for most purposes, we still require the ground surveyor to help site the highly intricate but accurate radar apparatus necessary for the job.

After this we must site, build, and man a number of bases along the route. These are necessary as diversion airfields in case of emergency, for weather reporting stations, refuelling dumps, and as sites for radio aids to navigation. Nor are we yet ready to operate. Many of these areas, as I hinted before, may possibly be uninhabited: for example, the polar ice-caps. They may be near to, or surrounded by, mountain ranges. In these cases there are gigantic tasks for our radio-physicists to tackle before some of the projected radio or radar aids of the future can be used. It may so happen that the radio signals from one of our newly-sited ground transmitters are masked from an aircraft in flight by intervening mountain ranges. To overcome this may mean using a different wavelength; it may even mean installing further ground stations.

In the regions of the Poles the radio problems are still more acute. As was explained by Sir Stanley Angwin in *The Geographical Magazine* of April 1947, there is a region of the upper atmosphere which is 'ionized', and known as the ionosphere. This region is composed of different 'layers', each of which has different reflecting or refracting properties on radio waves at different places over the earth's surface. Little is known about the behaviour of the ionosphere in the polar regions, except that at most times it is very active. A further difficulty in this respect, when flying over the Poles, is that for long periods of the year the polar regions are in darkness—the most active time of the day for the ionosphere is during darkness. This complicates matters for an aircraft flying in these regions if the ground transmitter is in the daylight zone. (See Sir Stanley Angwin's article for fuller explanation.)

The size and shape of land masses in relation to the seas has a profound effect on the weather conditions throughout the world. Over large areas of land, in summer the temperature is very high and in winter very low. On the other hand the sea tends to retain much of its warmth during the winter. As a result of this we find the tendency for large areas of high pressure (anticyclones) to develop over the sea in summer with relatively low pressures in the winter. The converse applies in the case of the land. It is from these pressure systems that the wind systems of the world are born. The wind (its direction and strength) is one of the chief worries of the navigator. If the wind velocities were ideal; that is, if they conformed with the theoretical pressure distribution outlined above, all would be well. However, such is not the case. In the same way as the ideal pressure distribution is modified so also is the wind which results therefrom modified by its passage over land masses. This is due to the irregularities in the shape of the earth's crust. The monsoons of India and China are caused by the seasonal variations in temperature, as a result of large land masses adjacent to large oceans. In many parts of the world we find



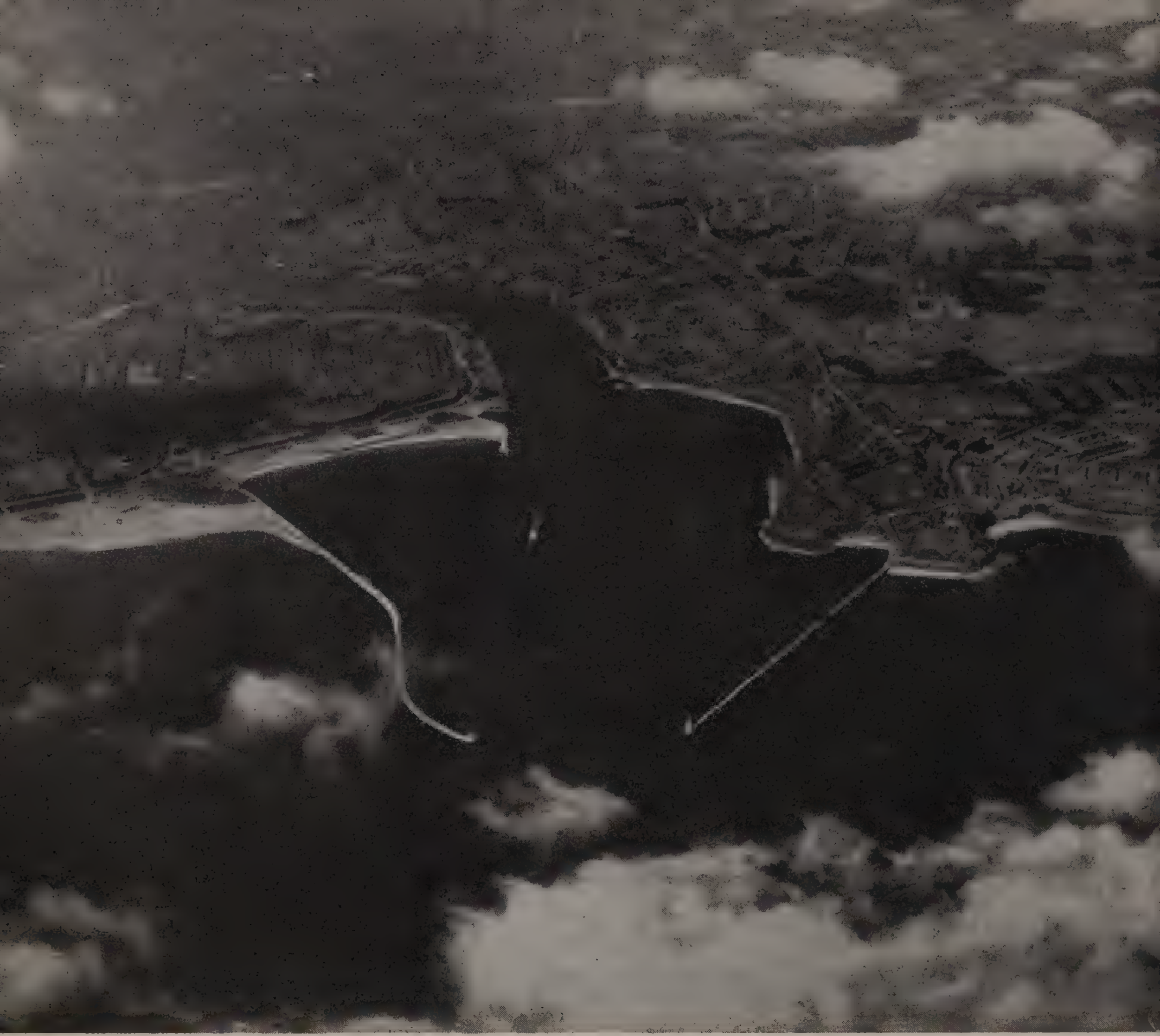
A. J. Thornton

Azimuthal Equidistant map of the world, centred on London. On this projection a straight line from London to any part of the world is a great circle track, and can be measured by means of the scales. The bearing to any place, measured at London, is the initial great circle bearing. Bearings and distances between places other than London cannot be measured on this projection

'special' winds peculiar to a particular locality. They are all caused by certain peculiarities in the local topography, such as valleys enclosed by high mountain ranges; or large expanses of desert. Examples of such winds are: the Föhn, a warm dry wind encountered to leeward of high ground; the Mistral, a strong northerly wind in the Gulf of Lions; the Sirocco, a southerly wind in front of east moving depressions along the Mediterranean coast of Africa.

I have said before that future air routes are likely to pass over high mountain ranges and perhaps implied that our modern aircraft will discount them as potential physical dangers. This is not so. Although, in the main, long-distance aircraft will if possible fly over even the highest ground, the shorter-range feeder lines will no doubt find it uneconomical to fly at such great heights. In fact, even the long-range aeroplane will, on occasion, find that it must fly round the mountains instead of over them.

This introduces further practical problems. For example, we must have some aid to the



ero Pictorial Ltd.

An aerial view of Tynemouth, which serves to illustrate certain points in map-reading technique. The most obvious feature is, of course, the river-mouth, while next in importance are the southward and then eastward bends of the river; finally, the manner in which the buildings are crowded around the river-mouth should resolve any possible ambiguity concerning the identity of this town

pilot which will warn him of dangerous high ground in the path of the aircraft. Such a high-ground warning device is at present being developed by our radar experts. Another possible kind of high-ground warning device is the radar beacon known as a Eureka, which, although it is at present being used (for other purposes) at normal altitude bases, has not yet been tried at high altitudes. This may be due to the fact that it requires a ground party to site, install and service a radar beacon on top of the dangerous high ground. The practical difficulties of carrying out this work at the top of, say, Everest, have probably ruled out the attempt. Yet is it so difficult? I implied that the beacon should be at the summit, though in fact it need not; so long as it is not too far away and its position is known, the work of servicing, etc., could ideally be carried out by helicopters.

THE POLAR CAPS

Neither the North nor the South Pole holds any terror for the airman today. True, a polar flight is not the same proposition as one in lower latitudes; different techniques are used and different and more complicated instruments are required. The most important aspect of polar flying *today* is the preparation for the flight. Special arrangements must be made to ensure complete safety. Before polar flying becomes commonplace—which eventually it will—a great deal remains to be done.

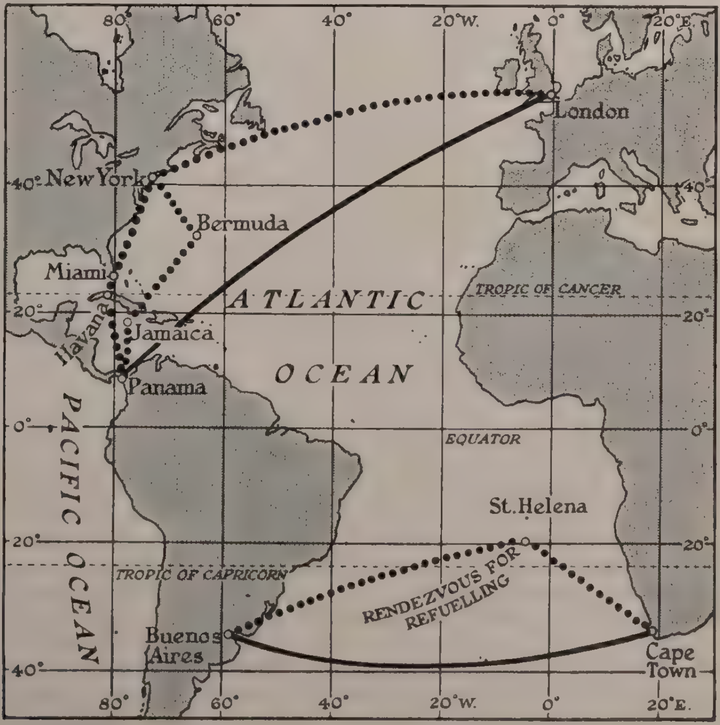
Perhaps the greatest need is for more accurate data than we at present possess on the values of the magnetic elements. The actual positions of the North and South Magnetic Poles, and the value of both the horizontal and vertical components of the earth's magnetic field in these regions, are urgently required. Without these, the value of the magnetic compass is negligible.

Many meteorological problems remain to be solved for the areas around the Poles. These cannot be satisfactorily solved until such time as both the Arctic and Antarctica are covered by a network of weather-reporting stations. The very basis of weather forecasting depends on regular weather reports from a large number of stations, and since these are at present lacking, there does not seem to be much hope of accurate long-range trans-polar forecasts for some time to come.

Although there are in existence numerous maps and charts of the polar regions, many of them are highly inaccurate. The charts—and in this sense we mean those used by the navigator for plotting—are perhaps adequate enough, though at present there is a certain amount of controversy over the actual projection which shall be used. The possibilities are: the Polar Stereographic, the Lambert's Conformal, and the Transverse Mercator projections. It is when we consider the present-day maps—i.e., those showing the topography in detail and used for map reading—that we find the position far from satisfactory. An up-to-date and accurate series of topographical maps is most essential, but before these are possible intensive aerial and ground surveys will have to be made.

Our astronomers, too, have a job to do in the polar regions before they are completely safe for navigation. As many will know, the sun, moon, planets and stars are used by the navigator to determine his position. Owing to the earth's atmosphere the rays of light from all heavenly bodies are refracted. The amount of this refraction depends, among other things, on the altitude of the body. When 'taking a sight' for navigational purposes the navigator must make due allowance for refraction, and he obtains the value from

It may prove more economical to fly from London to Panama via New York and the West Indies instead of direct. Similarly, by using the modern flight-refuelling technique, it would be cheaper and safer to fly from Cape Town to Buenos Aires via a point south of St. Helena (total distance 4200 miles) rather than direct (great circle, 3800 miles)



A. J. Thornton

pecially prepared tables. Refraction varies directly as the density of the atmosphere. Two factors which will vary this are the height of the observer and his latitude. The latitude factor normally is negligible, but at the Poles it must be accounted for, since there there is a marked temperature inversion. That is, in the lower layers temperature increases with height instead of decreasing. This fact will obviously give rise to abnormal densities in polar regions. When a heavenly body is just above the horizon, refraction is considerable, and it is also apt to vary on occasions. For this reason bodies at low altitudes are rarely used for navigational purposes in normal latitudes. In the polar regions, however, when the sun is visible it is always at a very low altitude, and sights must often be taken on it when its elevation is no more than one degree. No accurate set of refraction tables for the polar regions at present exists; and, for the reasons outlined above, the provision of such tables is also a matter of some urgency.

CENTRES OF TRAFFIC

Potentially, all the air space above the surface of the earth is available for the use of air traffic. Not all of it is likely to be used, however; the lines of communication are most likely to follow well defined routes. These routes, even though they may cover large areas, will all converge upon the major trading cities of the world. Commercial aircraft will not travel without a payload, and the maximum payload will nearly always be found on a journey between two large cities. The amount of payload, however, which an aircraft can carry is dependent on the amount of fuel necessary to make the journey. It is for this reason that, at present, there are no large commercial jet-engined aircraft. The petrol-driven engine is much more economical in fuel than its jet counterpart.

The shortest route between two centres of commerce may be across trackless wastes or ocean, and for this reason the shortest route may not necessarily be the most economical. The aircraft in all probability will not be able to carry the necessary fuel for the flight and will require refuelling. In this event two possible courses are open to the planners. Each has its own merits, and the chosen one will depend on the planners' particular requirements.

Supposing it is desired to set up two routes: one, on which traffic will be heavy, between Cape Town and Buenos Aires; and the other, which it is estimated will run at a loss, between London and Panama.

In the first instance the planners' problem is to carry the maximum payload on each journey with minimum overheads. Now, the great circle distance between Cape Town and Buenos Aires is approximately 3800 miles. It is calculated that for the particular aircraft which is to be used it will not be possible to cover the cost of petrol with the fares. Increasing the fares would only tend to make people find some other mode of transport. Therefore the only practical alternative is to reduce the amount of fuel carried. This, of course, cannot be done directly. However, advantage can be taken of the fact that an aircraft can carry a greater load of fuel *once it is airborne*. In other words, it may be possible to refuel *in the air*, and by this means a greater payload can be carried. In the example quoted, it may reasonably be found that by taking on only enough fuel to reach a rendezvous south of St Helena (where it is intended to refuel) a very substantial increase may be made to the payload.

In the second case—that of flying with a small payload from London to Panama—refuelling in flight will not save the overheads. In this instance, it may well prove profitable to forgo the advantage of the shortest route, and fly so as to call at commercial ports such as New York, Miami (or Bermuda), and Havana (or Jamaica).

Further occasions at present exist when an airline planner might forsake the shortest distance: for example, when the route lay over a long sea crossing; and he might do this in the interests of safety. In the future, however, this factor will probably be eliminated. Through the vigilance of designers, maintenance crews and operating crews, aircraft losses due to failures—whether mechanical or navigational—have at present dropped to a very low figure. Atlantic crossings by aircraft are today nothing out of the ordinary, yet who, thirty years ago, would have thought it possible? In the not too distant future we may yet see both military and civil aircraft capable of operating to and from any part of the world and over any part of its surface. Before this stage is reached, however, many tasks remain to be done. Physicists, astronomers, surveyors, meteorologists, cartographers and navigators all have their part to play. Geography in many of its aspects has an important and urgent task to perform before we can confidently aim at complete safety of air navigation over any part of the world.

Animals in Art

V. Egyptian

by Professor M. E. L. MALLOWAN

The plates accompanying the following article were taken in the Mastaba (tomb) of Mereruka and represent only a single period. In this respect, as Professor Mallowan points out, they fail to do justice to the Ancient Egyptian artist's creative ability in depicting animals. But the limitations within which he worked imposed uniformity of treatment to such a degree that no wider range of illustrations would reveal more fully the chief characteristics of his technique and of his approach to the animal world, which he observed with such astonishing accuracy. For the notes on the plates, showing their biological interest, we are indebted to Professor F. E. Zeuner

The Mastaba of Mereruka which lies on the high desert plateau south of Cairo, within easy reach of the famous stepped pyramid of Saqqarah, is a notable landmark in the art and history of ancient Egypt. For this splendid funerary monument was built, not for the Pharaoh, but for his vizier, the highest potentate in the kingdom after the ruler himself, and is a token of the increasing power of the aristocracy in the later stages of the Old Kingdom. The great pyramid of Cheops was as it were the topmost pinnacle of royal authority: afterwards the pyramids themselves were no longer built on so vast a scale, whereas the tombs of the nobles became grander and more expansive, aspiring to a share in the wealth and prosperity which was assured for the Pharaoh in this world and the next. Under the fifth and sixth Dynasties there was a great expenditure of wealth and talent on the furnishing and decoration of these noblemen's tombs. The end of that period witnessed an inevitable collapse both of the established royal house and of the old artistic traditions, for the Pharaoh was no longer able to contend against the overweening ambition of his many servants. When a house is divided against itself, how shall it stand?

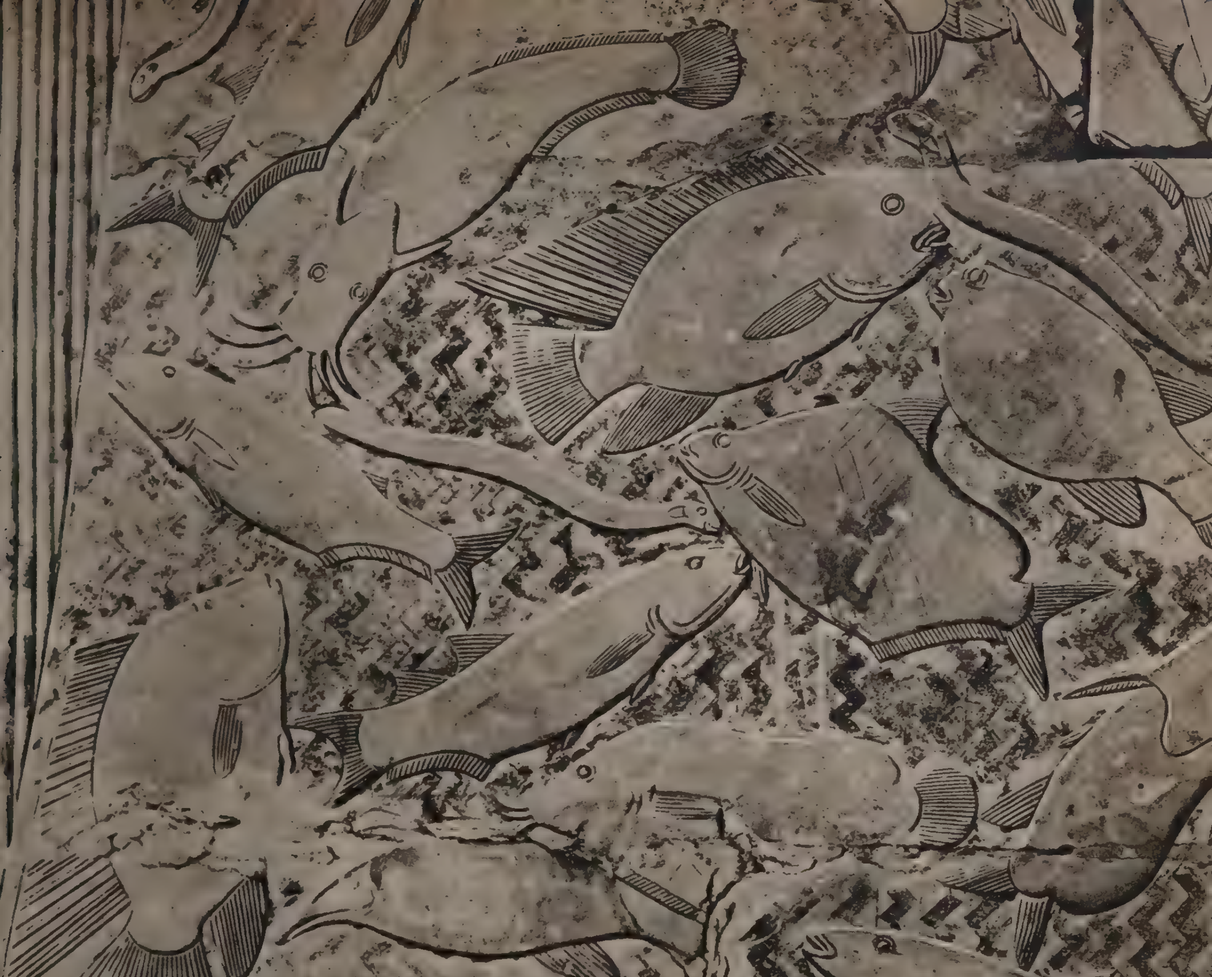
Mereruka, "overseer of every work of the King", also dignified with many other distinguished titles, held office under the Pharaoh Teti who was probably reigning in the 24th century B.C., at a period when the Nile, Tigris and Euphrates valleys witnessed a high degree of economic prosperity. Mereruka was a son-in-law of the Pharaoh and his tomb as well as the tombs of his relations were magnificent and properly endowed. The vizier's mastaba consisted of over thirty chambers and corridors and was divided into three parts, one for himself, one for his wife and one for his son. The walls of the tomb were decorated throughout with scenes carved in low relief illustrating every phase of the occupant's activity during his lifetime. The fine carving of these low reliefs was heightened by the application of paint in the primary colours: rich red ochres, brown, yellow, blue, green, white and black designs were enhanced by the grey background of the mastaba walls. The reliefs depict the vizier, his beautiful wife, his mother and his sons, and the daily round of activities pursued by the employees on his estate. Hunting, shooting, fishing, animal husbandry, scenes in the fields, reaping, winnowing, threshing, are depicted in the lively style of the Old Kingdom artists. And we have many fascinating glimpses, too, of other activities and incidents. We see the metal workers smelting and blowing through the bellows, boat building, ritual games and dances, offenders being flogged at the whipping post for non-payment of taxes, servants bearing meat, wine, oil, linen and bedding for the perpetual use of their master. The ceremonies for the ritual burial of Mereruka, solemnised by all the proper observances, are also illustrated in detail.

Among the great variety of official and domestic scenes depicted on the tomb walls, nothing is more striking than the snapshots of animal life. Here we have the ancient naturalists' field sketch book with the designs worked up for official publication. An astonishing collection of wild and domesticated animals gives us an animated picture of the fauna characteristic of the far ends of the Nile valley and of the desert plateau. The incidents peculiar to marsh and river life have been graphically displayed. We are made to feel the exciting moments of the chase, the thrill which attends the fish catch and the final netting; the dramatic climax when the hippopotamus comes to be speared; the savage moment at which the Egyptian hound fells the antelope or the desert Oryx antelope and makes the kill. We see the lion—perhaps a lion deliberately used by the huntsman—attacking a wild bull. Nothing is more charming than the miniature sketches of the hedgehog, the foal of the antelope and the timid hare concealed behind the desert scrub. The rendering of many different specimens of Nile fish, including grey mullet, catfish, perch and eels, betrays the same close observation of nature. The fish are alive and swimming, twisting and turning under water; their flexibility is delicately portrayed without exaggeration and with a sure economy of draughtsmanship. Among other kinds of animals which will interest the naturalist there is the genet, deadly to reptiles and vermin; the grasshopper and the venomous horned viper. Bird life, too, is richly represented, and the majestic design of the Sociable vulture in the last plate is a masterpiece of ornamentation. Here we can see how much loving care was expended by individual artists on designs which would often have been better displayed in isolation, but had perforce to be included in the crowded official record.

This brief description of the painted mural reliefs gives a clue to the limitations imposed on Egyptian art by the canons of religious and technical practice. For the Ancient Egyptians mural art was essentially a form of literature, the record of things seen, described in a formal manner. The conventional mechanics of representation nearly always excluded perspective and foreshortening, and generally confined the perception of objects to a single plane. Such limitations were at once a source of strength and of weakness. The draughtsman had little scope for experimenting with new forms or for overstepping the imposed spatial limitations. For a period of three thousand years the changes that did occur "never broke the outer skin of the style"—to use the words of Roger Fry. Yet within these limitations the Egyptian artist was constantly renewing his vitality and producing fresh masterpieces. Even in the so-called decadent periods, when the official records became increasingly cramped, overcrowded and stereotyped, some artist would renew the powers of creation which had been preserved for him by continuity of artistic tradition. Thus it is that to the superficial observer the representation of animals may seem strangely uniform at all periods in Egyptian art history. But to conclude that animal-representation remained static would be far wide of the mark. Indeed, those who turn from an examination of Mereruka's murals to the animal-paintings of the Middle and New Kingdoms will see how different were the new modes of treatment.

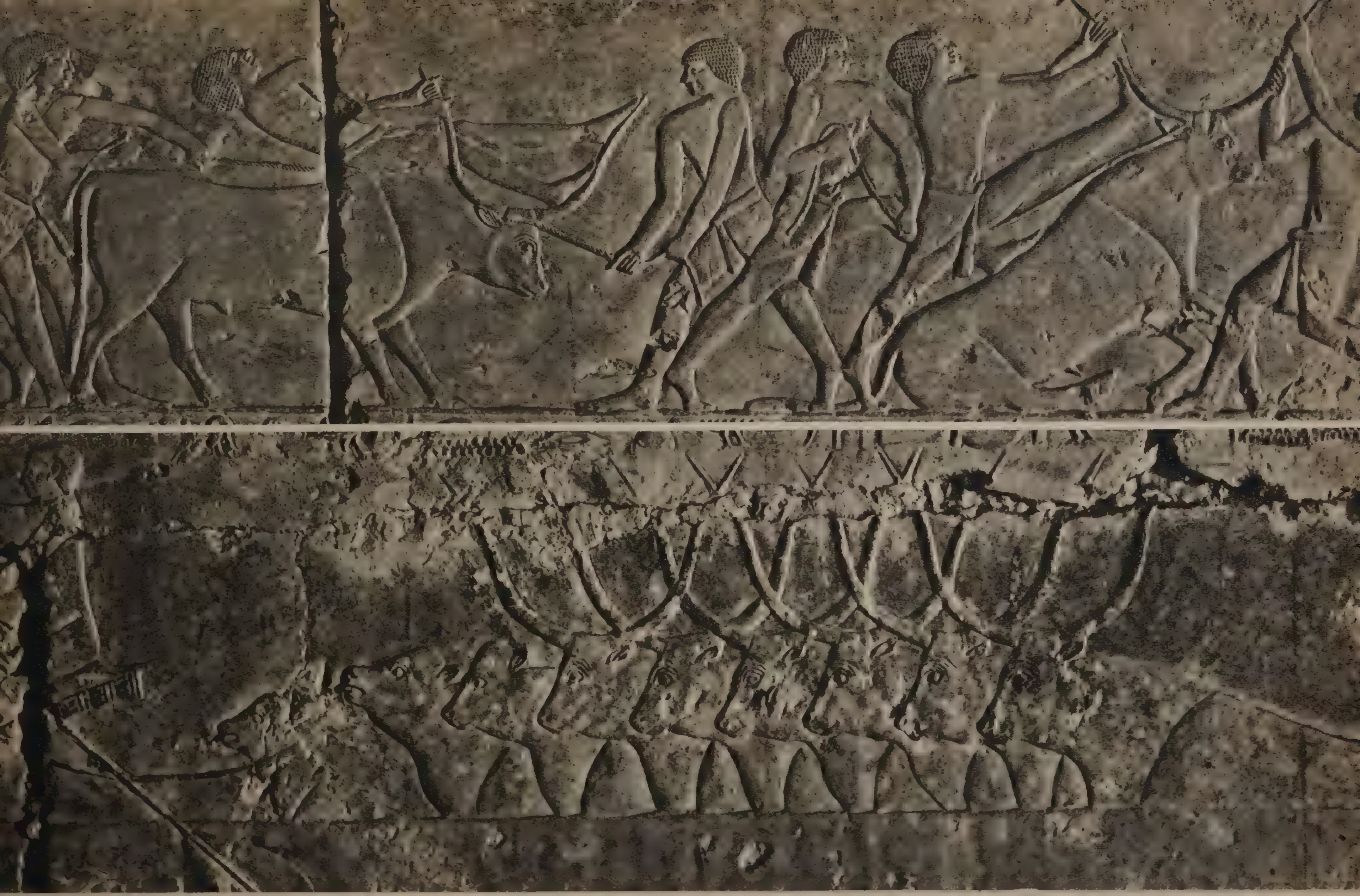
The pictures in Mereruka's tomb demonstrate what can also be discovered at many other periods, that the best Egyptian artists and craftsmen were close observers of nature, realists in their love of precise detail, confirmed stylists in their method of execution. The handicap of being obliged to work in confined spaces the craftsman overcame through his exact knowledge of how he was to set about his work, supplemented by a very keen pictorial memory. We have to remember that at the time of their erection these tombs must have been crowded with an army of masons, sculptors, stonecarvers and painters, making it exceedingly difficult to achieve unity of composition, which in any case was often incompatible with the preordained decorative scheme. For this reason some of the individual carvings and paintings on the tomb walls stand out as masterpieces of craftsmanship detachable from the whole.

Mereruka's murals thus display the strength and weakness imposed by the ancient artistic canons, and they also mark the final stages of Old Kingdom craftsmanship. It has to be remembered that the intention of these reliefs was primarily religious and magical, intimately connected with the hopes and fears of mortal man, and the illustrations have to be interpreted accordingly. But penetrating the formality of the ancient ritual we can sense the Egyptian's joy of life no less acutely than his preoccupation with death. A careful examination of these records enables us to attain a deep insight into the Ancient Egyptian mode of life and concrete cast of mind. For the Egyptian artist, in his record of things seen, completed an act of dedication which was equivalent to an endowment in perpetuity of the legacy of life. He was thereby reacting to his natural horror of annihilation—a horror which was, perhaps, the mainspring of Egyptian continuity. The pattern of the animal world was so closely interwoven with that of the Universe that men, beasts and gods could be corporeally intermingled. Animal life was but one aspect of the animate forces which pervaded the entire material world. The animal which the artist imprisoned in concrete form thus represented the shape of things past, on less than the shape of things to come.

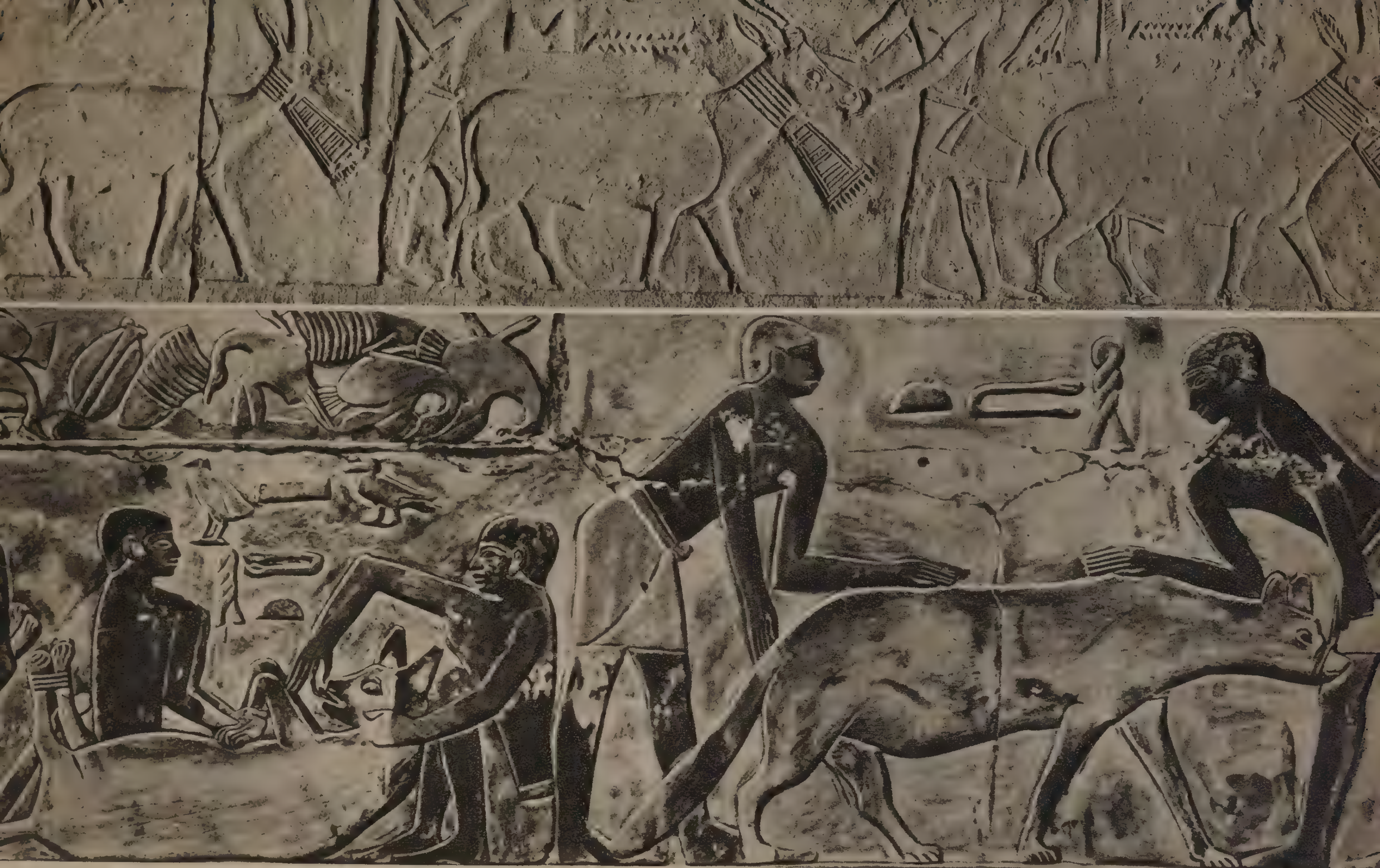


Mural in the Mastaba (tomb) of Mereruk

*A magnificent representation of the fish fauna of the Nile, comprising as many as thirteen species. Whilst the relative sizes of the different kinds of fish are not correct, their shapes and diagnostic features are often quite unmistakable. Note, for instance, the mormyr (*Oxyrynchus *of the Ancients) just above the end of the boat, with its long and down-curved snout, or the* Tilapia *with its splendid dorsal fin. The most interesting is a cat-fish (fourth from bottom along right-hand margin), a type called* Shal Batn Soda *by the Egyptians—the shal with the black belly. It has the habit of swimming belly-up, and is shown in this position*

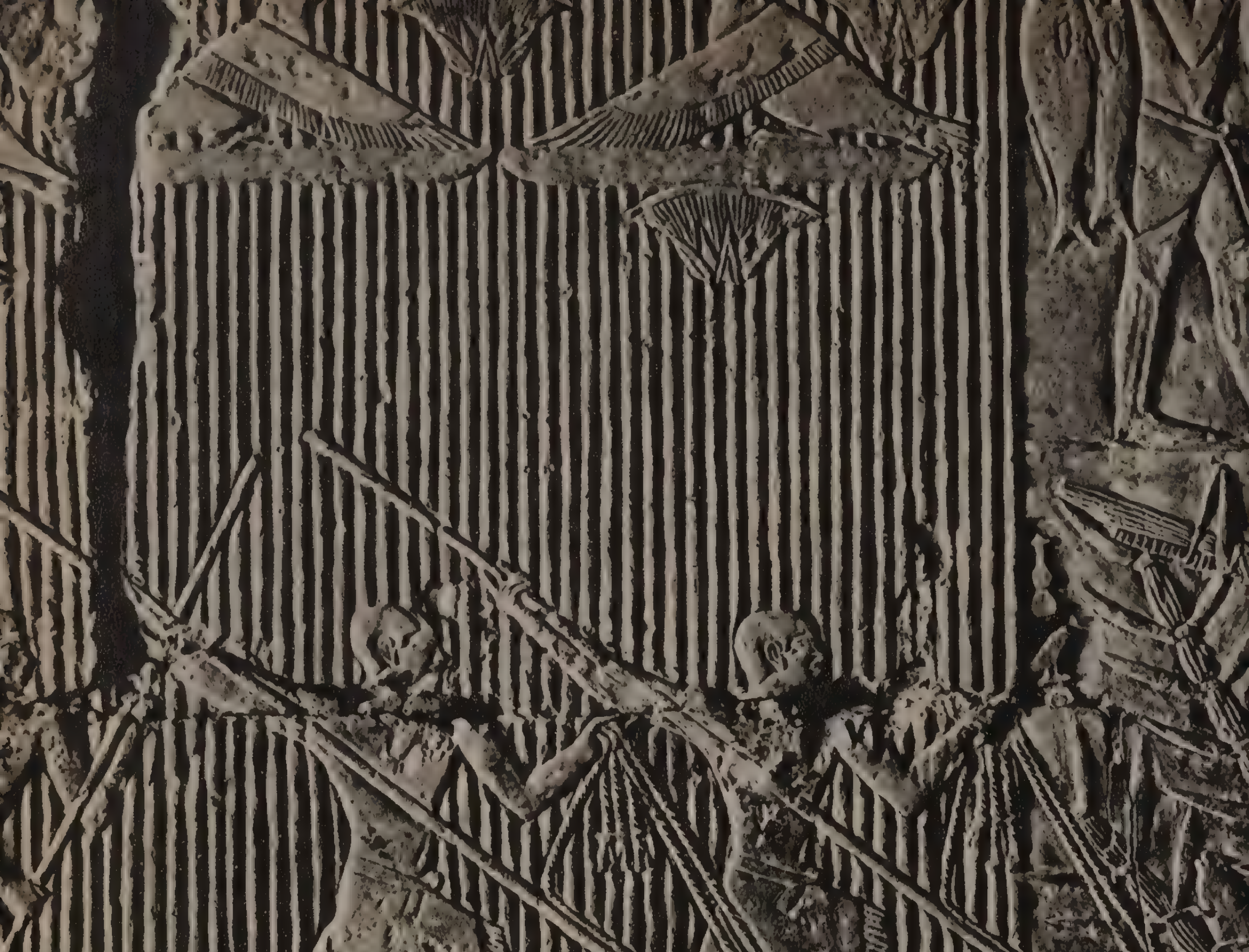


(Above) *The throwing of long-horned cattle, possibly prior to slaughtering.* (Below) *Cattle driven across the water. The first boat is pulling a calf followed by its mother. Both betray excitement—the calf appears to be bleating and the mother answering its call*

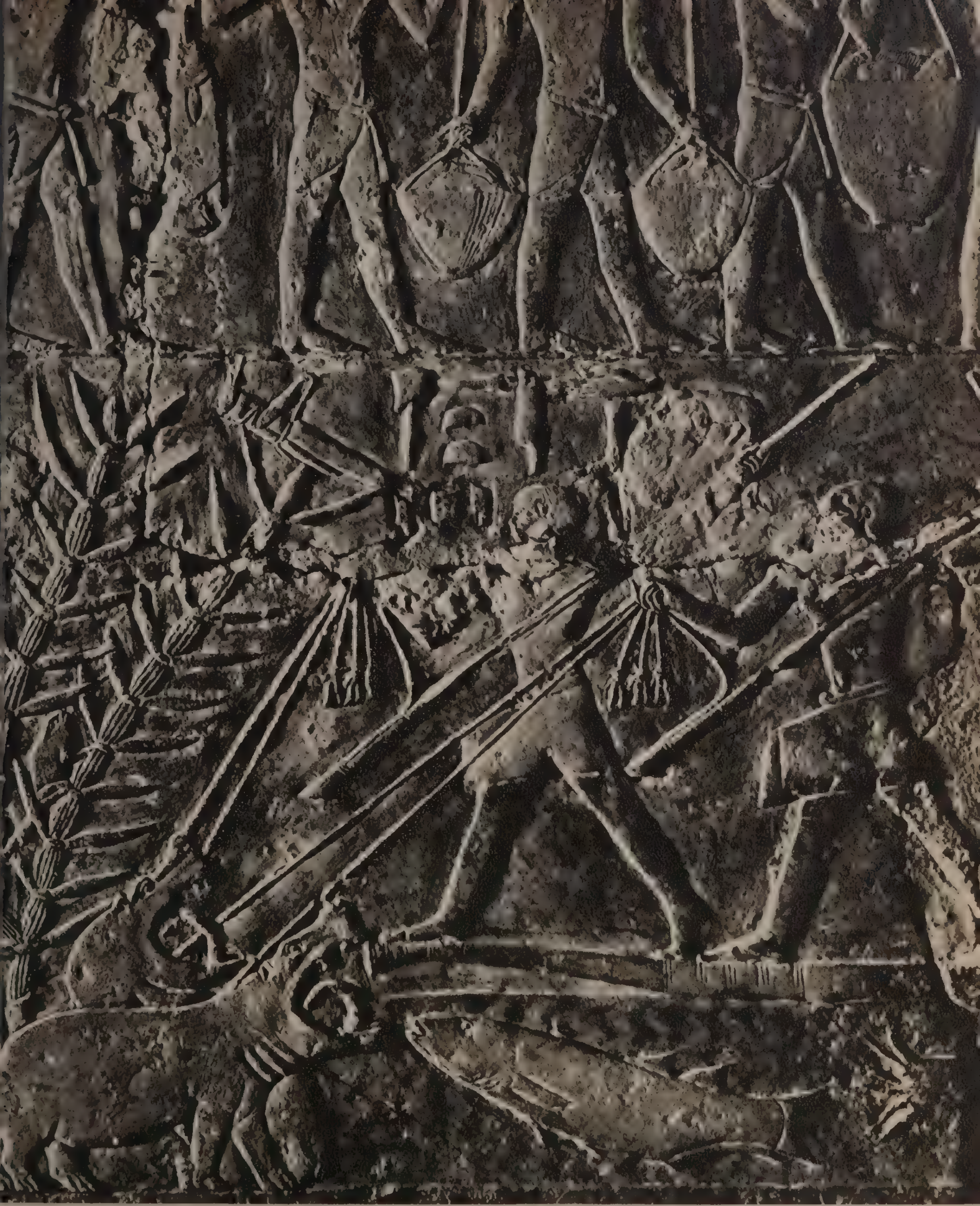


Murals in the Mastaba (tomb) of Mereruka.

(Above) *Gazelle, Addax antelope and Nubian ibex, with elaborate collars. These and other antelopes were commonly kept in captivity*
(Below) *Captured hyænas being stuffed and fattened for the kitchen. Whether these were striped or spotted hyænas is uncertain*

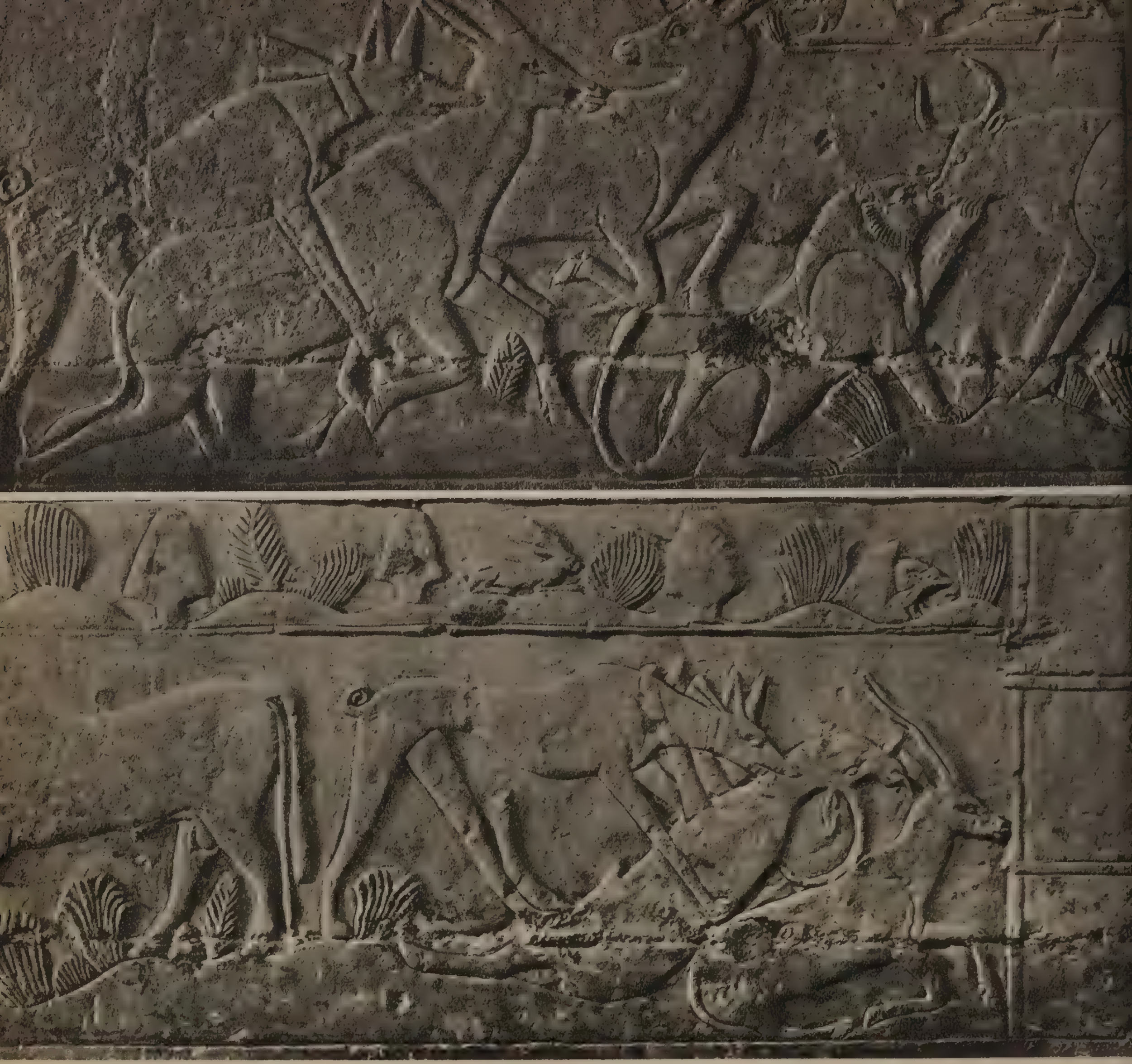


Three hippopotami in position of defence, attacked by men in boats, who are about to cast harpoons. These are spears with hooked points to which long ropes are attached just behind—

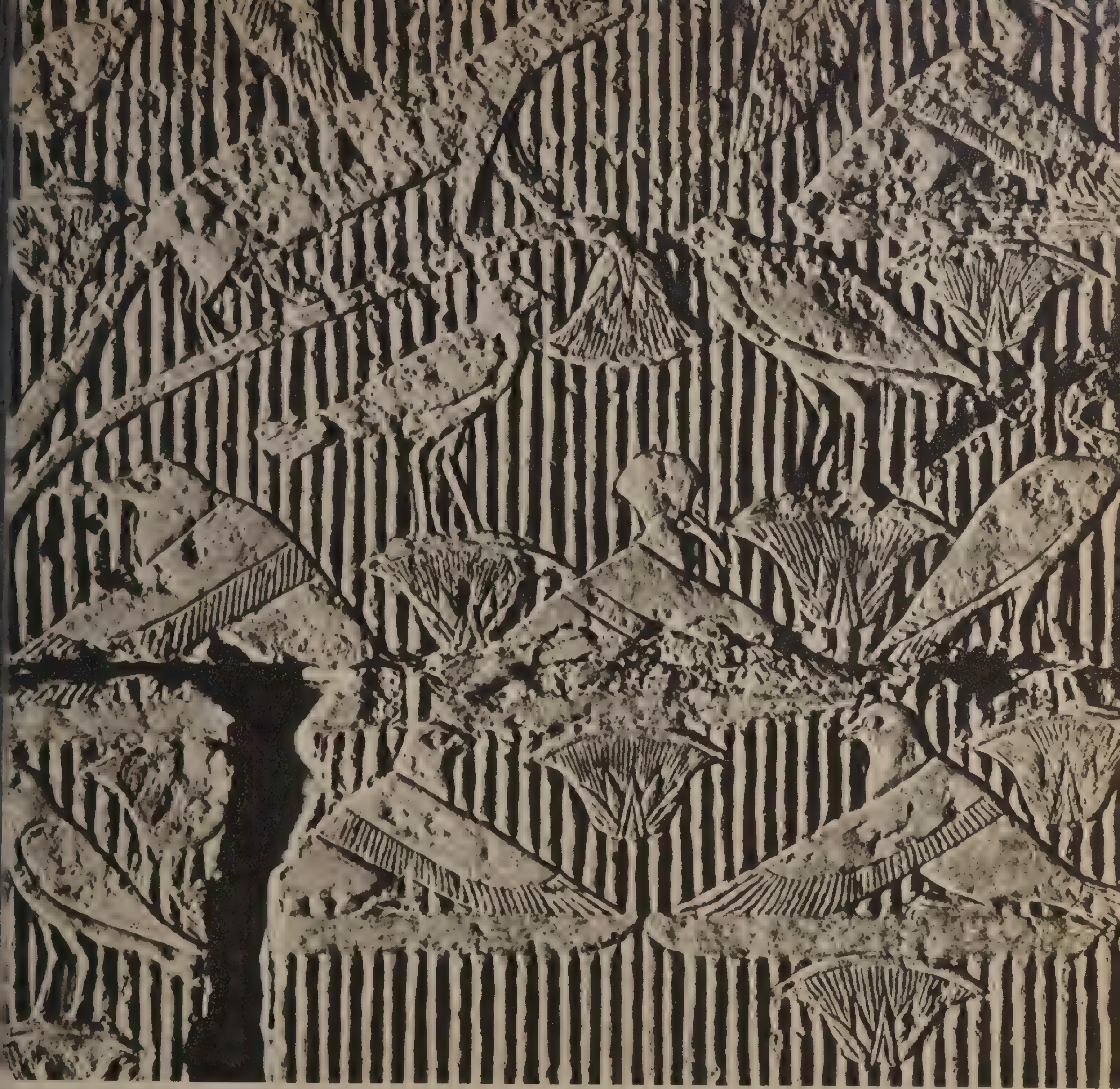


Mural in the Mastaba (tomb) of Mereruka.

—the point. Eight of these weapons have already been thrown, and the hunters hold the ropes in their hands. In the water, a crocodile is shown on the left and fishes on the right

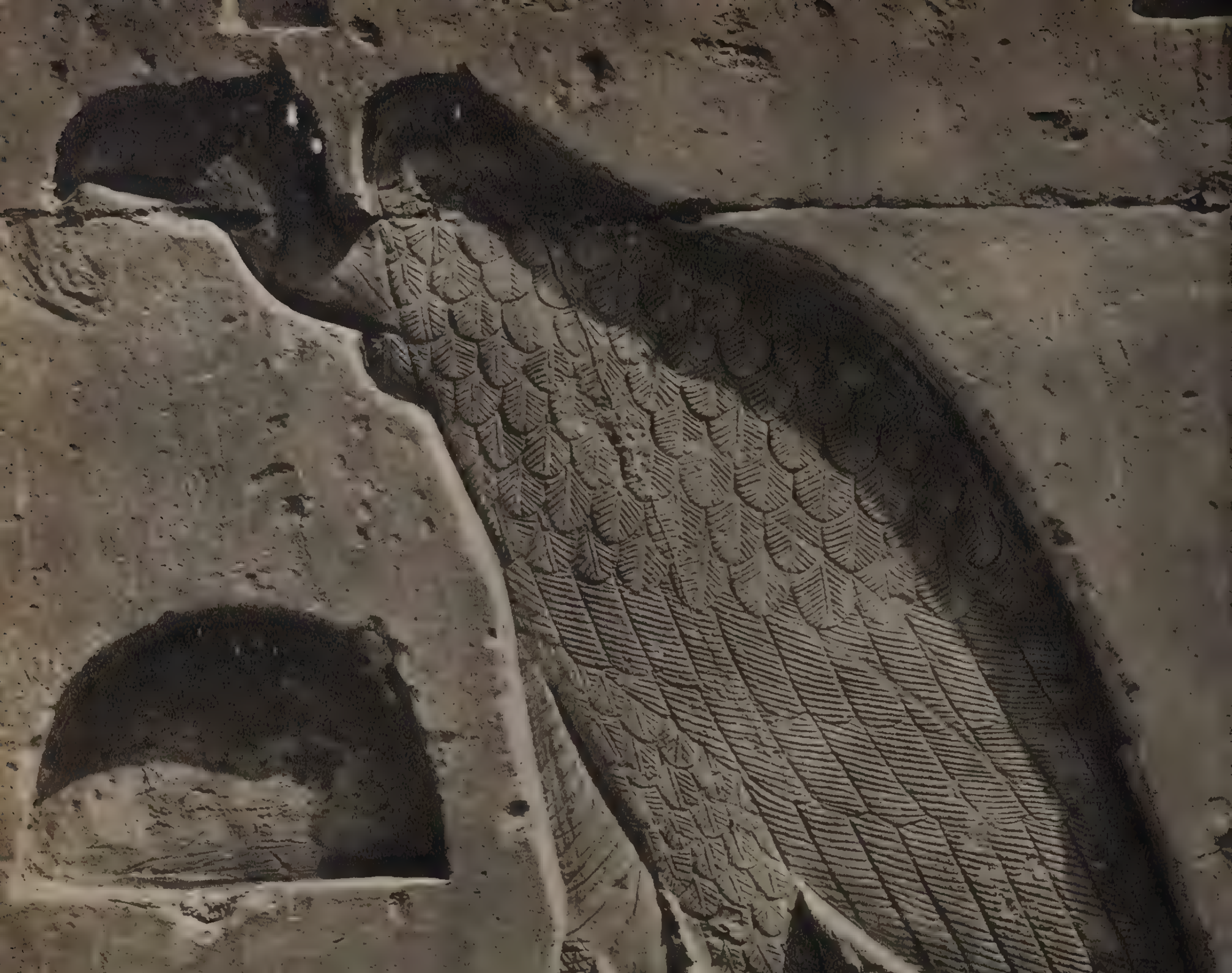


Hunting with greyhounds. The Egyptian greyhounds had curled tails and large pointed ears. They are seen to have brought down an Oryx antelope (above) *and an ibex* (below). *An Addax antelope is seen lying near the ibex. A lion is attacking a wild bull which is purging itself in fright. A charming little frieze shows the smaller forms of animal life, the fawn of a gazelle, hedgehogs and the Egyptian hare, all hiding in the vegetation*



Murals in the Mastaba (tomb) of Mereruka.

Bird life in the papyrus swamps. On the background of vertical lines indicating the thicket of papyrus, coots, herons, a night-heron, waders, a hoopoe and pigeons are shown, several of them nesting. The prowling or bird-nesting carnivore on the papyrus is not the commonly depicted ichneumon, nor is it a mongoose. The large and erect ears and the tail, which is set off from the hind-quarters, rather suggest that this animal is a genet



All photographs by Leslie F. Thompson from " The Mastaba of Mereruka," by courtesy of the Oriental Institute, University of Chicago.

The northern form of the Sociable vulture. It has a lappet, indicated in the picture by a line running from above the eye down to the throat. This representation is of interest since the vulture usually depicted in early dynastic scenes is another species, the Griffon. A horned viper or asp is shown below the vulture

The Greatest Scourge of All Time

by RENÉ ELVIN

In the early part of 1348—just 600 years ago—a small, grimy ship coming from Tartary landed at the port of Caffa in the Black Sea with goods from far-off China. It also carried a more fateful cargo. The landing planks admitted not only men and merchandise but also rats to the rickety wooden wharf and muddy streets of the small town. Before long most of the crew and two-thirds of the population were dead, killed by the first onslaught of what was to become the most disastrous epidemic of all time. It was the Black Death.

Soon the plague spread to all Mediterranean countries. The carriers of the contagion were everywhere the same: rats and the fleas which fastened on them found only too ready a medium of propagation in the appalling squalor prevalent in the towns of those days. One of the first countries to be struck by the pandemic was Italy, and the greatest story-teller of the period, Boccaccio, gives of its impact on his city of Florence a graphic description that no modern journalist could hope to better.

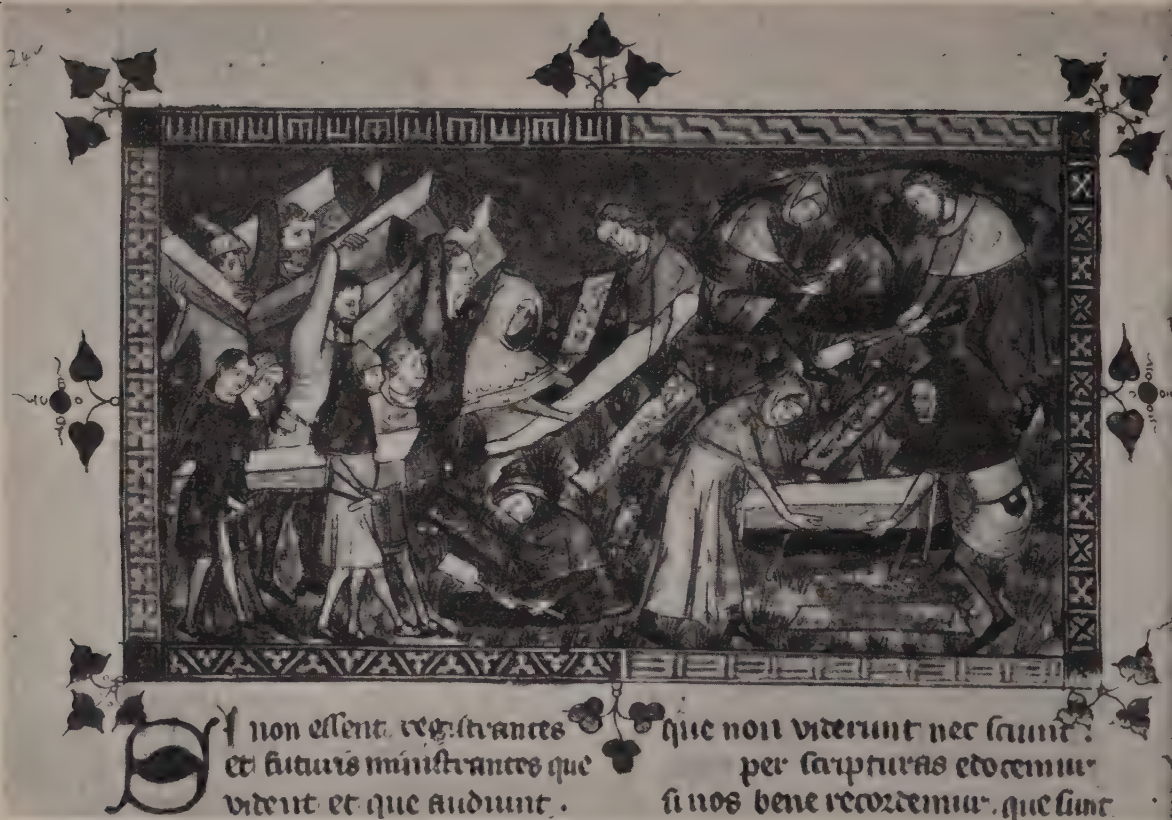
"In men and women", he wrote, "there appeared at the beginning of the malady certain swellings, either in the groin or under the armpits, some as big as an apple, others like an egg, some bigger and some smaller. . . . From these two places, the death-bearing plague-boils spread indiscriminately to every part of the body. After a while, the symptoms of the disease began to change into black or livid blotches which usually appeared first on the arms or thighs and thence spread to every part of the person, in some large and sparse and in others small and thick-sown; and like as the plague boils had been first (and still were) a very certain token of death, even so were these for every one to whom they came.

"No physician's council, no virtue of medicine whatsoever seemed to have any effect of profit against that sickness . . . so that not only were cures few, but almost all died within three days of the appearance of the fatal signs, some sooner and some later, without either fever or contributory cause. And this pestilence was all the more violent because, by communication from the sick to the sound, it spread no less rapidly than fire will spread to dry or oily things that lie close at hand. And, worst still, not only did the speaking or association with sick folk bring the disease to the sound, or involve both in one common death, but even to touch their clothes, or anything else which the sick had touched or handled, seemed to convey the same sickness to him who had touched."

From the Mediterranean, ships brought the disease to all the ports of Europe. Such was the ignorance of the most elementary sanitary precautions that nothing was done to prevent its tidal sweep. Superstition strengthened fatalistic submission to the apparently inevitable. With one voice, the clerics ascribed it to the wrath of God.

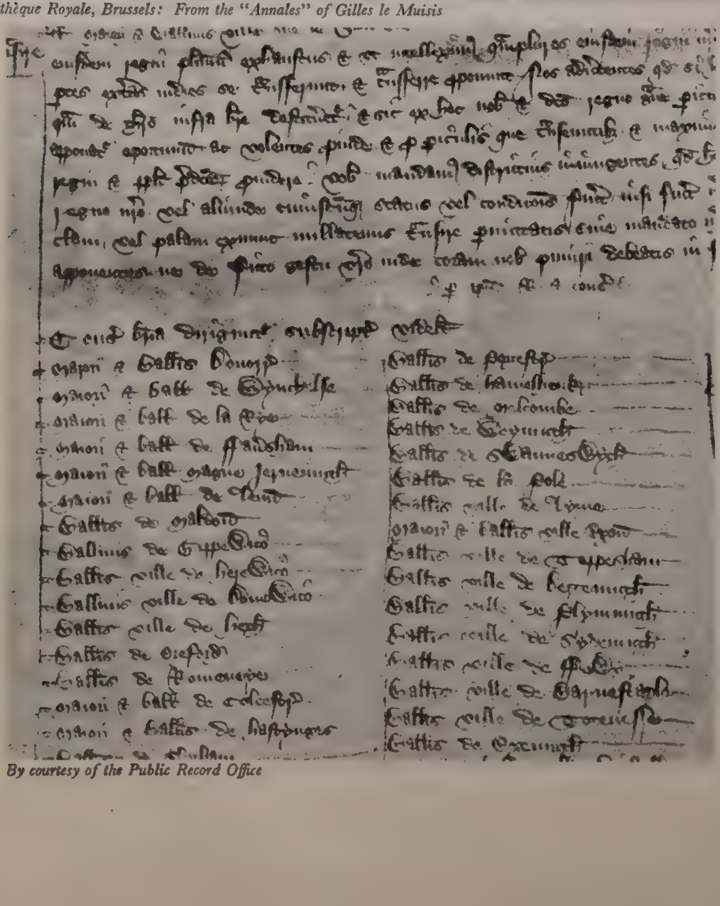
In *Piers Plowman*, Reason proves "that these pestilences were for pure sinfulness". The Leicester cloisterer Knighton, who disliked "bold women and luxurious men", thought he knew exactly what had caused it all: "In those days", he reported, "there arose a huge rumour and outcry among the people, because when tournaments were held, almost in every place, a band of women would come to share the sport, dressed in divers and marvellous dresses of men—sometimes to the number of forty or more ladies of the fairest and comeliest, though not of the best, among the whole kingdom. There and thus they spent and lavished their possessions, and wearied their bodies with fooleries and wanton buffoonery. But God brought marvellous remedy: that same year and the next came the general mortality throughout the world."

The medical faculties were equally cocksure—and no more helpful. The Pope's doctor, Guy de Chauliac, was certain the trouble had begun with "a grand conjunction of Saturn, Jupiter and Mars under the sign of Aquarius". Distinguished physicians, asked what people could do to save themselves, gave strange advice. "Cold, moist, watery food is in general prejudicial", they said. "Too much exercise is hurtful. . . . If it rains, a little fine treacle should be taken after dinner. Fat



Si non eſſent regiſtrantes
et futuris miniſtrantes que
vident et que audiunt.
que non viderunt nec ſciunt:
per ſcripturas edocemur
ſi nos bene recordemur. que ſunt

Bibliothèque Royale, Brussels: From the "Annales" of Gilles le Muisis



By courtesy of the Public Record Office

(Left) *Text and list of recipients of a letter sent by Edward III in December 1349 to the mayors and sheriffs of seaports: "Whereas no small portion of the people of our realm of England hath died during the present plague, and our Treasury hath been greatly exhausted and we are given to understand that many of our people are daily betaking, and intending to betake, themselves to foreign parts, with money which they may have in our realm. . . . We hereby charge you . . . on no account to allow to pass over sea from your port . . . except by our special orders, any men at arms, even foreigners, or any others of our realm"* people should not sit in the sunshine. . . ." For treatment, they ordered cautery of the boils and bleeding. One notable physician was curiously selective in the choice of his methods. Observing that most patients who were bled subsequently died, he "reserved this remedy for the plethoric, especially for papal courtiers and hypocritical priests".

Current opinion held that the infection was spread by "thick stinking mists" in the air. To purify it, leading medical scholars recommended "large blazing fires of odoriferous wood". Similar prescriptions remained in favour for centuries during the frequent recurrences of the disease. Garlands of thyme and rosemary were prettily worn or fingered even by grave magistrates on the Bench. Though few are aware of it, it is that usage which is recalled to this day by the nursery rhyme:

Ring a ring of roses,
A pocket full of posies,
A-tishoo, a-tishoo,
We all fall down . . .

the last line being perhaps a grim reminder of the suddenness with which the scourge struck —and of the little faith there was in this remedy by the time the rhyme was composed.

But let us go back to the spread of the Black Death. Soon after devastating Italy, it ravaged England. It first appeared at Melcombe Regis, the port of Weymouth, coming, probably, from France. From there it spread to Bristol, "where there died, suddenly overwhelmed by death, almost the whole strength of the town, for few were sick more than three days, or two days, or even half a day". By the late summer of 1348, the plague reached London. In its filthy streets and fetid houses, it spread like wildfire. Over 50,000 corpses were buried in one charnel alone, hastily improvised on the site of the present Charterhouse Square.

The autumn was wet. Rain fell almost without a break from Michaelmas to Christmas, and the mires were favourable breeding grounds for the germs. Everything seemed to help the contagion, which rapidly expanded throughout the country. No reliable statistics are available, but it is computed that at least one person in every three died of the Black Death in England and Wales. More than 25,000,000 perished in the rest of Europe, and

(Opposite, top) "*A host of coffin bearers and sextons*" *preparing to bury plague victims in the middle of the 14th century.* (Below) "*Plague Sick in Front of Church*", *from a woodcut by H. Weiditz*

over 36,000,000 in Asia.

Mortality was at its worst in towns and large villages, where the living were hardly able to bury the dead. As usual in such calamities, the extremes of both courage and cowardice were shown. In many places the priests performed unflinchingly the dangerous duties of their calling, ministering to the sick and dying, and catching the sickness so often that in the diocese of Norwich two-thirds of the parishes were left without incumbents. Among the monastic orders, whose crowded life was particularly favourable to the spread of the plague, whole communities perished, from the abbot down to the novices. On the other hand, not a few parsons, as one chronicler says, "deserted their parishes for fear of death, or because their parishioners had been so diminished by the plague that they could not live upon such oblations as were left".

The Archbishop of Canterbury lashed at unworthy clerics: "The unbridled cupidity of the human race has, since the coming of the plague, perverted the heart of the clergy, who neglect to bear the cure of souls and to support the mutual burdens of parish priests; nay, they even abandon these altogether, so that, under a simple title and with little labour, they claim greater profits than the parish priests". And 'Long Will' Langland, a reliable witness wherever he describes the evils of the times, wrote in the Prologue of his *Piers Plowman*:

> Parsons and parish priests pleyned them to the bishop,
> That their parishes were poor with the pestilence time,
> To have a licence and a leave at London for to dwell
> And singen there for simony; for silver is sweet.

The upper classes suffered slightly less than the poor; but King Edward III's daughter Joan and two successive archbishops of Canterbury were among the victims. The long continuance of the epidemic, which lasted well into 1350, cowed and demoralized society. Lawyers thrived on the confusion of inheritances. The Jews were accused of poisoning the wells, and whole colonies of them were burnt alive.

Decencies were forgotten. Chroniclers report

(Above) "*Dancing Maniacs*" (*after Pieter Bruegel the Elder*), *showing plague victims in a state of delirium*. (Left) "*Death and the Doctor*," *one of the fifty-eight woodcuts designed by Hans Holbein the Younger for his* "*Dance of Death*" *series* darkly of orgiastic debaucheries by hardened sinners who followed the only too obviously applicable maxim: "Let us eat, drink and be merry, for tomorrow we die". Religious fanatics wandered from town to town, scourging themselves in public places, or indulging in hysterical fits of the Dancing Mania.

Everywhere men and women fled in panic, they knew not where, rushing away from the tide of death in one place only to be overwhelmed by it in another. And Cardinal Gasquet, pondering on all that, was understandably puzzled: "Strange as it may seem", he wrote, "men are not, as a rule, made better by great and universal visitations of Divine Providence."

In many ways, the Black Death was the most important event of the Middle Ages. After it, nothing was ever quite the same again. The whole structure of society was shaken to its foundations. The kingdom was then essentially an agricultural community, worked on the manorial system, in which tenants performed forced services for their landlords. After the scourge, the landowners found thousands of crofts deserted, and could not fill them with new tenants. "The sheep and cattle strayed through the fields and corn", says a contemporary, " and there were none left who could drive them." The surviving peasants wanted to get rid of compulsory labour altogether, and demanded wages considered exorbitant by the landlords. Before the Black Death, a labourer's wages were a penny a day; after it, they rose to two or three pence.

The frustrated lords tried hard to put the clock back. Parliament, which at that time represented almost exclusively the interests of the upper classes, issued ordinance after ordinance forbidding workmen to demand more than they had received before the Black Death.

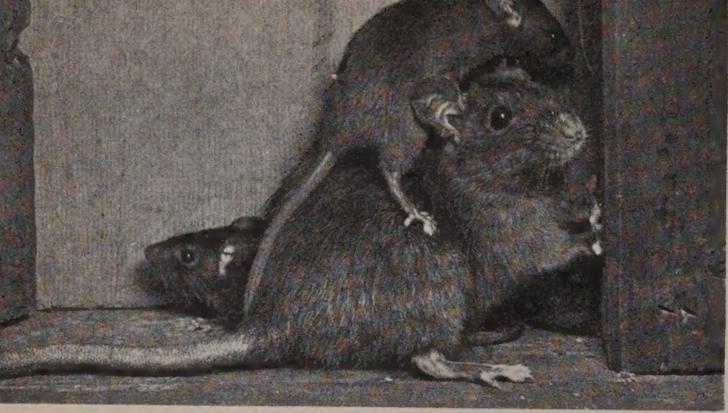
The struggle lasted for thirty years and ended in the Peasants' Revolt of 1381. The labourers were literally too many for the landlords. Oppression bred resistance and labourers, when driven too hard, fled to the cities, where hands were needed as much as in the countryside. Gradually, the landowners discovered that the only way out of their difficulties was to give up the old system of forced labour and to divide their demesnes into farms that were rented to free tenants and cultivated by them. This system finally prevailed, and it may be said that the Black Death played a part in the creation of that sturdy and prosperous class, the yeomen of England, who for centuries were to be the strength and backbone of the realm.

Rats in London

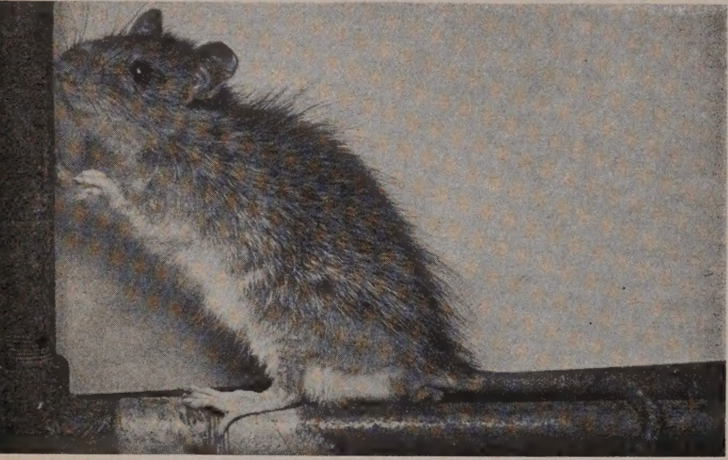
by ANTHONY BARNETT

Zoologists call rats 'commensals', which might be taken to mean that they share our dinner tables. Actually, rats get at our food at almost every stage between the fields where it is produced and the plate off which we eat it. Rats have benefited from the invention of agriculture almost as much as man, since it has allowed the storage of food surpluses in quantities far beyond anything to be found elsewhere. Since then several of the advances of civilization have presented rats with further opportunities. Large-scale seaborne trade has made possible the spread of two species of rat throughout the world. A thousand years ago it is probable that there were no rats in Britain, although house mice and field mice were already on the scene. The smaller of our two species had reached us by the 12th century. This was *Rattus rattus*, so-called black rat, a species which exists in several colours; a variety common in some areas has a tawny back and white or pale yellow belly. It seems, however, that the earlier invaders of the West of Europe were mostly black; it is a curious fact that the proportion of black individuals increases as you go north. Nevertheless, there are plenty of pale ones in Britain today. *R rattus* is a climbing rat. Perhaps its ancestors were tree rats. Certainly, in many countries today this species is found nesting in trees and eating fruit. The pale variety is even called *R. rattus frugivorus*. An alternative name is *tectorum*—a reference to its habit, observed in some places, of living in the roofs of houses.

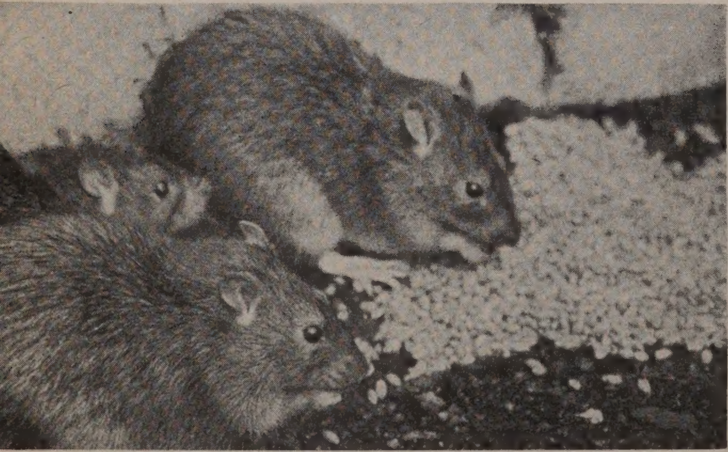
R. rattus was the plague rat of the Middle Ages. Our other species, the common brown rat, *R. norvegicus*, also carries plague, but it has not quite the grim reputation of the small species. For one thing *R. rattus* is much more of a house rat; in temperate climates it is usually obliged to live in buildings: its origin



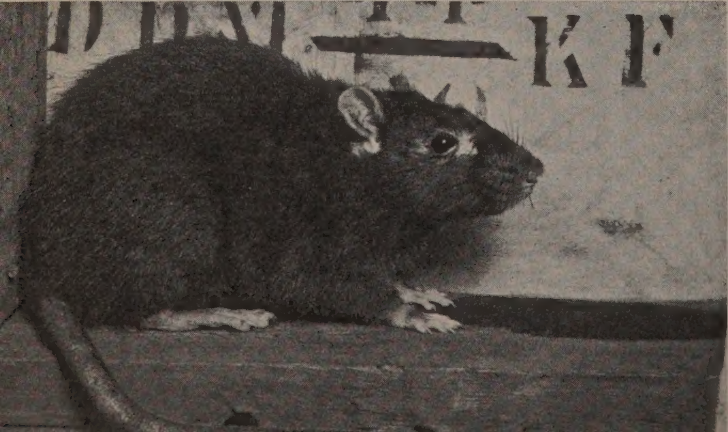
Rattus rattus, *the "black" or "ship" rat (female and her young): the plague rat of the Middle Ages, Britain's only rat until little more than two centuries ago and widespread throughout the country. Today it is found mainly in ports and in Central London*



R. rattus, *though called black traditionally, has several colour forms. This is one of the pale* frugivorus *variety—probably less general than the black in Britain, though in areas where it seems to have a special propensity or fruit it is more common*



Rattus norvegicus, *the common brown rat (group eating wheat). In baiting campaigns harmless bait is laid for several nights before poison is added so that the rats, no longer hesitating, eat larger amounts of it, whereby a high percentage kill is ensured*



R. norvegicus: *a specimen of the rare black variety—not to be confused with the larger-eared, longer-tailed* R. rattus. *This specimen, one of a colony of similar rats, was trapped on an Essex farm. The black colour is evidently an inherited abnormality*

Photographs 1, 2, 4 by John Markham,
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A rat-research worker, wearing head-lamp and protective clothing, emerges from a London sewer. Despite recent advances in methods of control, there is still much to learn about rat populations and what happens to them when large-scale control is attempted

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is in the sub-tropics, and it does not tolerate our winter out of doors. The more intimate association with man makes it a more likely source of infection.

R. norvegicus is a relative newcomer, of little more than two hundred years standing, but it took less than two centuries to become the common rat of Britain. In the 19th century an important advance in our amenities gave it a special opportunity: the advance was the widespread construction of sewers. The cesspools, open drains and casual disposal of filth gave rats far less opportunity than the extensive sewer systems of today. However, the moral is not to give up sewers, but to kill the rats; and in any case to ensure that the sewers and drains are of sound construction and give no opportunity for movement in and out.

London, as might be supposed, today provides examples of almost every sort of rat infestation apart from the purely agricultural. We have both species: *norvegicus* in warehouses, sewers, food premises, back gardens with their chicken runs, and so on; *rattus* especially in the docks and warehouses around them, and in the restaurants and hotels of Central London. Quite often both species are present in one building, perhaps with *R. rattus* on the upper floors and *norvegicus* on the lower ones. Typically, the common rat enters from below, very often from the sewers, while *R. rattus* may come in from above after climbing up the outside of the building. Either may enter a warehouse in sacked goods.

The relationship of *R. rattus* with the port area is very marked, and is found in the other main ports of Britain. This suggests that, in present conditions, with a competing species present, *R. rattus* cannot maintain its bridgeheads without continual reinforcement from abroad. (Most of the rats found on ships are *R. rattus*: and indeed we sometimes call this species the ship rat.) In India, and some other countries, the reverse holds: *R. rattus* is widespread, and *norvegicus* mainly restricted to the ports. However, in Britain *rattus* is not entirely a seaside species: it is established in some inland cities, and there are instances of its carriage, by road or barge, from the London dock area to towns in the Home Counties.

In London today rats are little more than a potential danger as disease carriers. We have had no serious plague for nearly three hundred years (though there was a small outbreak in East Anglia during the second decade of this century). Typhus, one form of which is rat-borne, is now eliminated. Some food poisoning may be due to rats, but it is difficult to prove. On the other hand there is a steady trickle of cases of Weil's disease, an often fatal form of jaundice carried by rats: sewermen are the principal sufferers in London; elsewhere coal-miners and fish-cleaners get it, and less often farm workers and people who bathe in streams with rat-infested banks. There is a certain incidence of trichinosis, a dangerous disease caused by a worm which may spend part of its life in the rat, part in the pig and part in man.

When it comes to food destruction the story is different. We do not know how many rats there are in London, though it is reasonably certain that the figure is far lower today than it was five years ago; the fall is the result of campaigns during and since the war. But a little sampling can give an impression of the problem. The lesser part of it is *R. rattus*; nevertheless in one five-story warehouse containing spices, during the course of three poison treatments, 1559 bodies were picked up. No doubt many died in inaccessible places and were never seen. This is one of the largest infestations of this species of which we have record, but it is not the largest of all. *R. rattus* is even more of a problem in the areas where it is found in small, elusive colonies in many neighbouring properties, especially small restaurants, cafés and hotels. Its movements are erratic, but unless whole blocks are well cleared in one stroke, it is likely to return soon after disturbance.

The same in principle applies to the common rat, *R. norvegicus*, with the added complication that with this species the sewers are likely to be, for any infestation, an important source of reinforcement. In the winter of 1943-4, forty-four Local Authorities of the London Area, under the direction of the Ministry of Food Infestation Control Division (now part of the Ministry of Agriculture and Fisheries) combined to bait the whole 3700 miles of their sewers. Several hundred thousand rats were killed, with consequent relaxation of subterranean population pressure. But we are still a long way from getting complete clearance, and further campaigns are undertaken at intervals by each Authority.

There is nothing new about the existence of a rat problem in London. In 1844 a young woman in her Holborn dwelling said to an enquirer:

> Look there at that great hole; the landlord will not mend it. I have every night to sit and watch or my husband sits up to watch because that hole is over the common sewer and the rats come up sometimes twenty at a time, and if we do not watch for them, they would eat the baby up.

The new thing in the situation is that we have now, for the first time, scientific methods for rat control, and an extensive organization for applying them Very little serious research on rodent pest control had been done before the war: perhaps the most extensive work had been done in Hawaii, where rats damage the sugar plantations. It is an extraordinary thing that, although masses of data had been accumulated on the white variety of *Rattus norvegicus*, which is the commonest of laboratory mammals, it took the second World War to induce us to study such familiar household pests as rats and mice. Now we have at least the foundations of a systematic study of their reproduction and behaviour, and of control methods.

This would be of little use without a large organization of people trained to use the methods. Since 1942 there has been a central authority for England and Wales, working through local councils, for all urban rodent control. Last year work on agricultural land was also brought under this authority. In London its agents are the borough councils, and in particular their health departments. But the citizens of London have a more direct part to play than in the influence they exert on their councillors. They, after all, are usually the first to know of the presence of rats. They may, if they wish, try to deal with them independently, with dogs or cats or something from the chemist; or they may buy a trap or two. But they are likely to find that such remedies give only limited and temporary relief. Even if they kill most of 'their own' rats, there are likely to be some in the sewers or next door. (Actually, few householders will admit rats to be their own: they are nearly always the neighbours' fault.) The solution is to inform the local authority, in the person of the sanitary inspector or rodent officer: he has the training and powers to enable him to operate on a large scale and with the best materials and methods.

The control of rodents is like nearly all large-scale applied biology, including the whole of medicine: it is the concern of the whole community, and not merely of a few specialists. In the great wen of London the task of the trained men would be hopeless without the understanding and help of the citizens.